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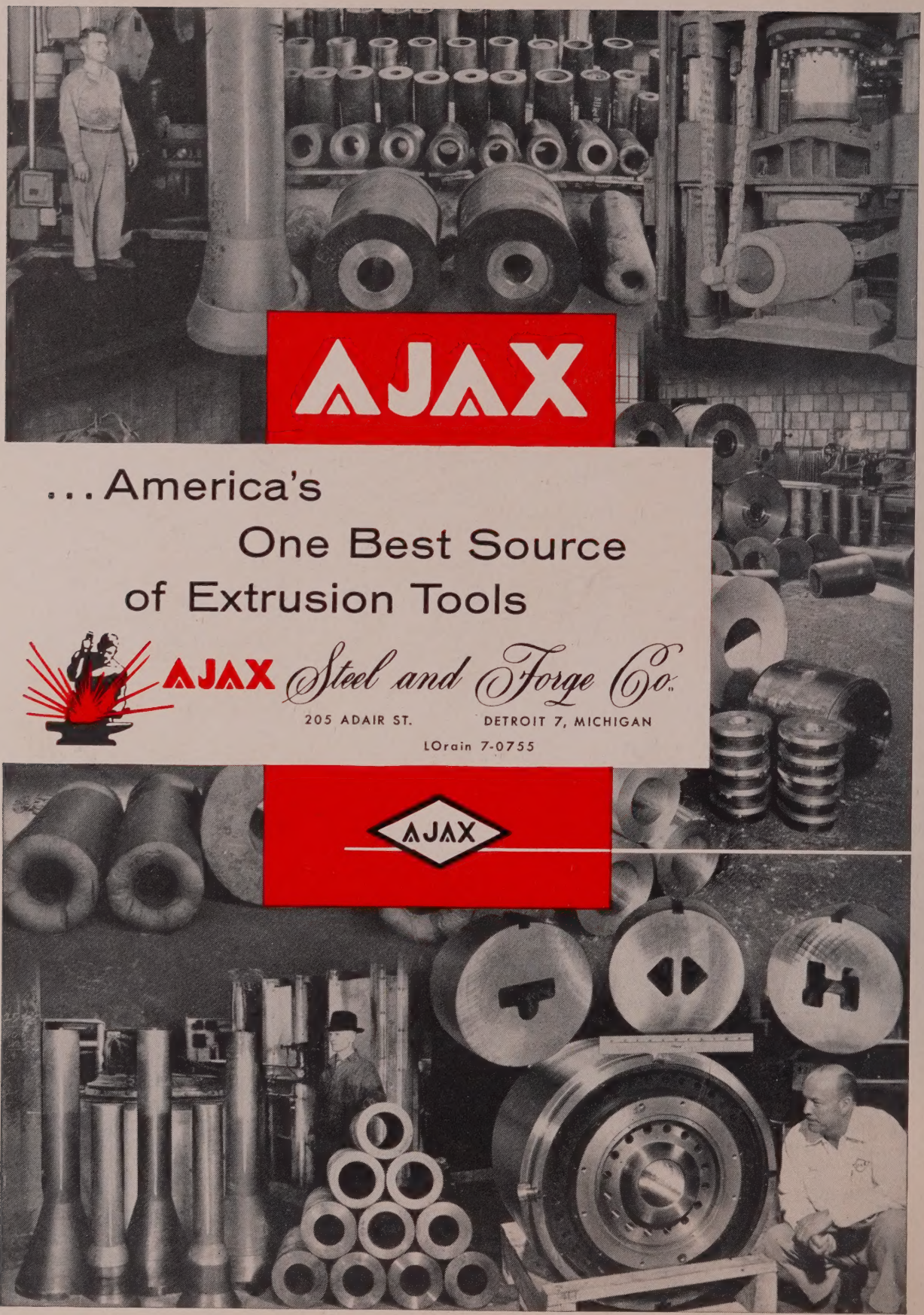
TRIPLE-DUTY SOLAR SCREEN

• Made of aluminum, it softens glare, cuts air conditioning load, serves as a modern facade for a library in New Orleans. Similar wall systems could be used to update old buildings (see page 32).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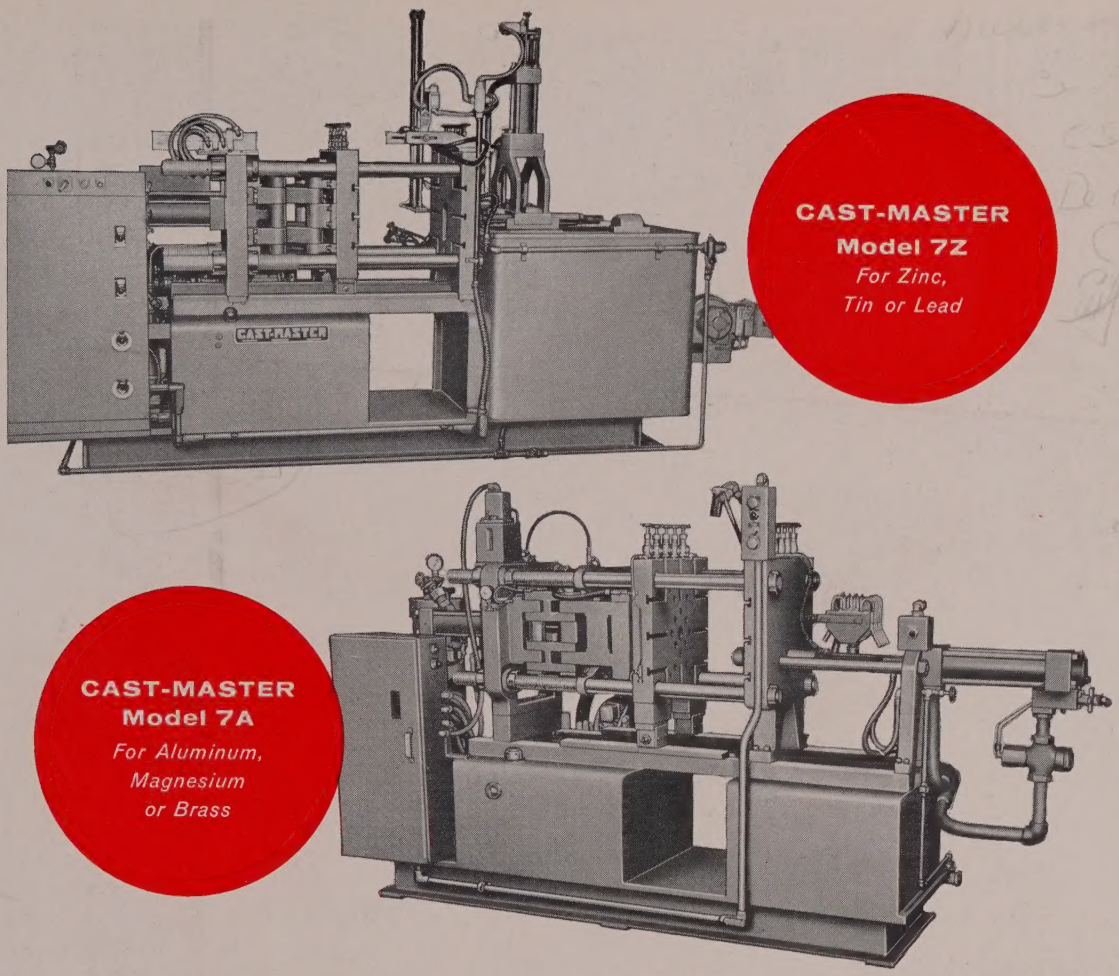

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SPECIFICATIONS

	Model 7Z	Model 7A
Die Locking Pressure	100 tons	100 tons
Distance between rods HxV	13½" x 13½"	13½" x 13½"
Tie rod centers, HxV	16" x 16"	16" x 16"
Tie rod diameter	2½"	2½"
Die mounting plates, TxHxV	3½" x 21½" x 21½"	3½" x 21½" x 21½"
Die thickness	4" min., 19" max.	4" min., 19" max.
Die stroke	4" min., 8" max.	4" min., 8" max.
Shot position	On center or 4" below	3½" below center
Shot cyl. dia.	2½"	3⅝"
Shot cyl. stroke	6½"	11"
Machine size, WxLxH	48" x 120" x 72"	48" x 120" x 58"
Weight, gross	6,900 lbs.	6,400 lbs.

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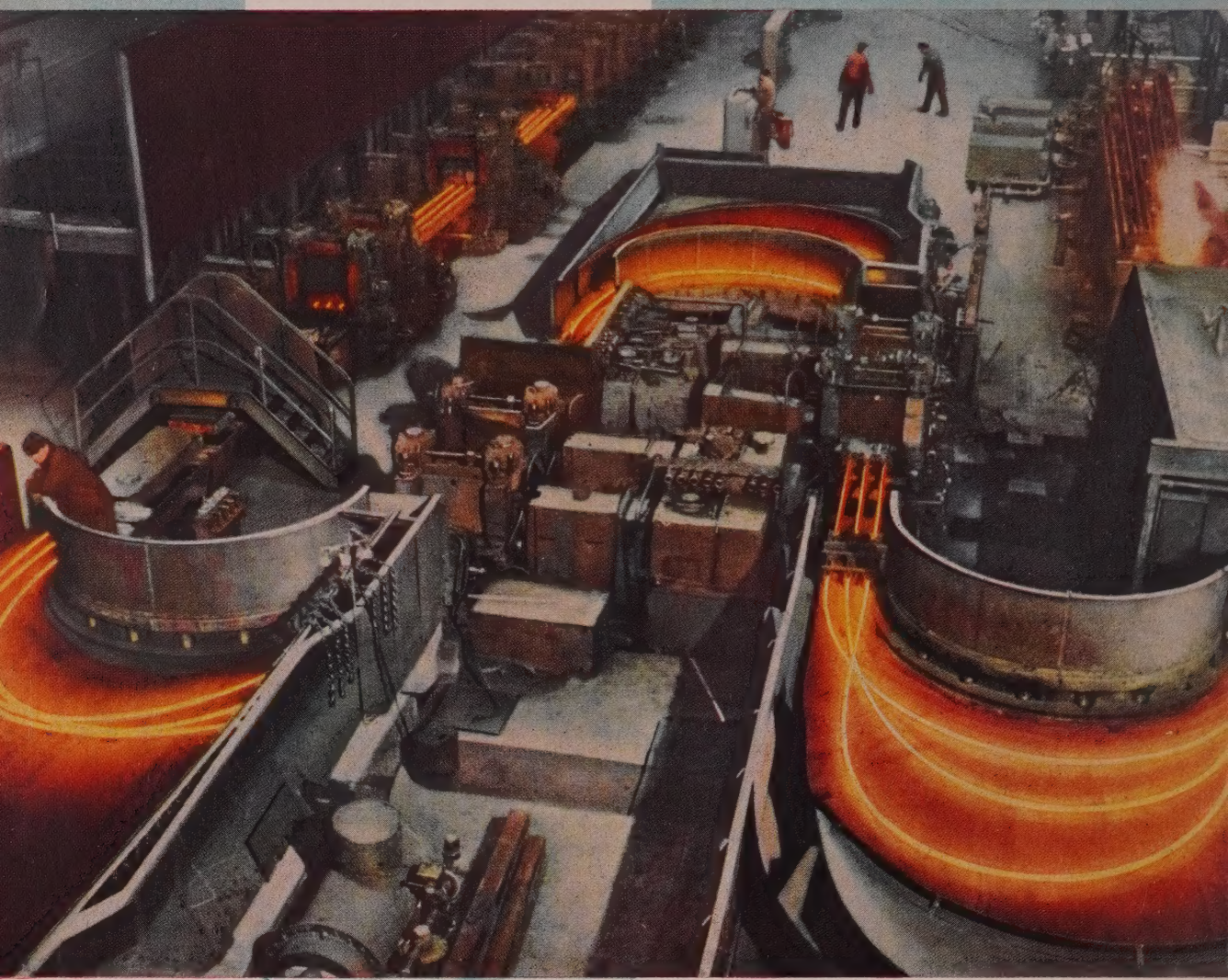

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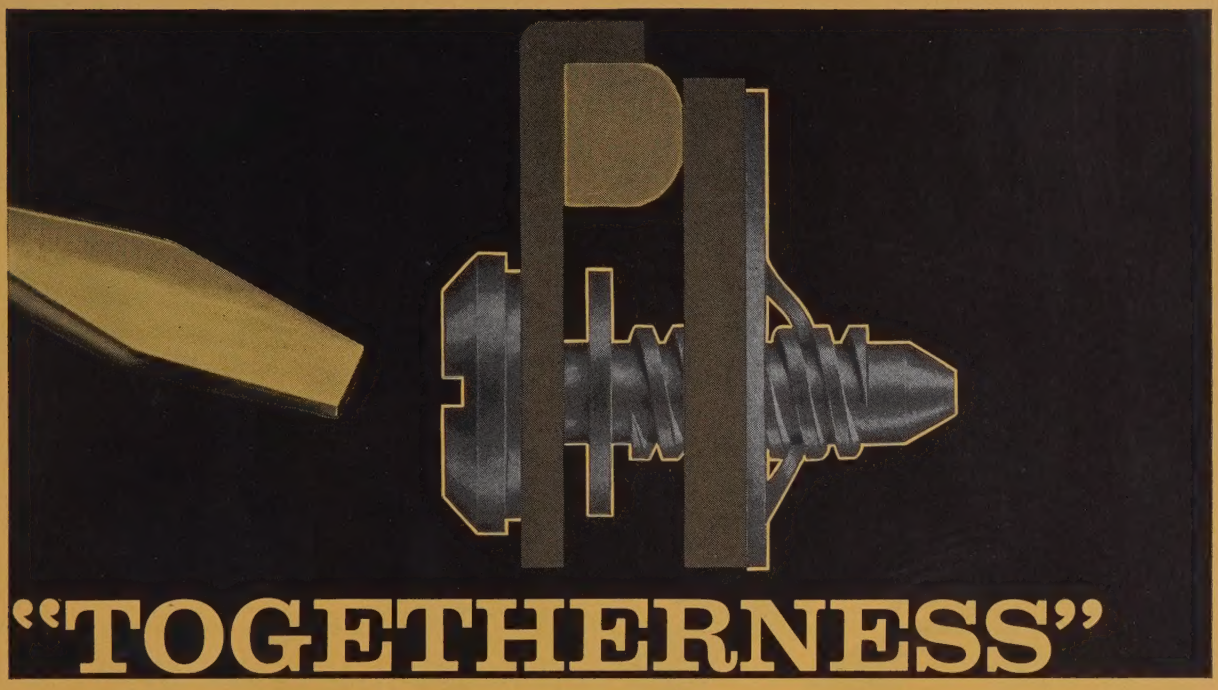

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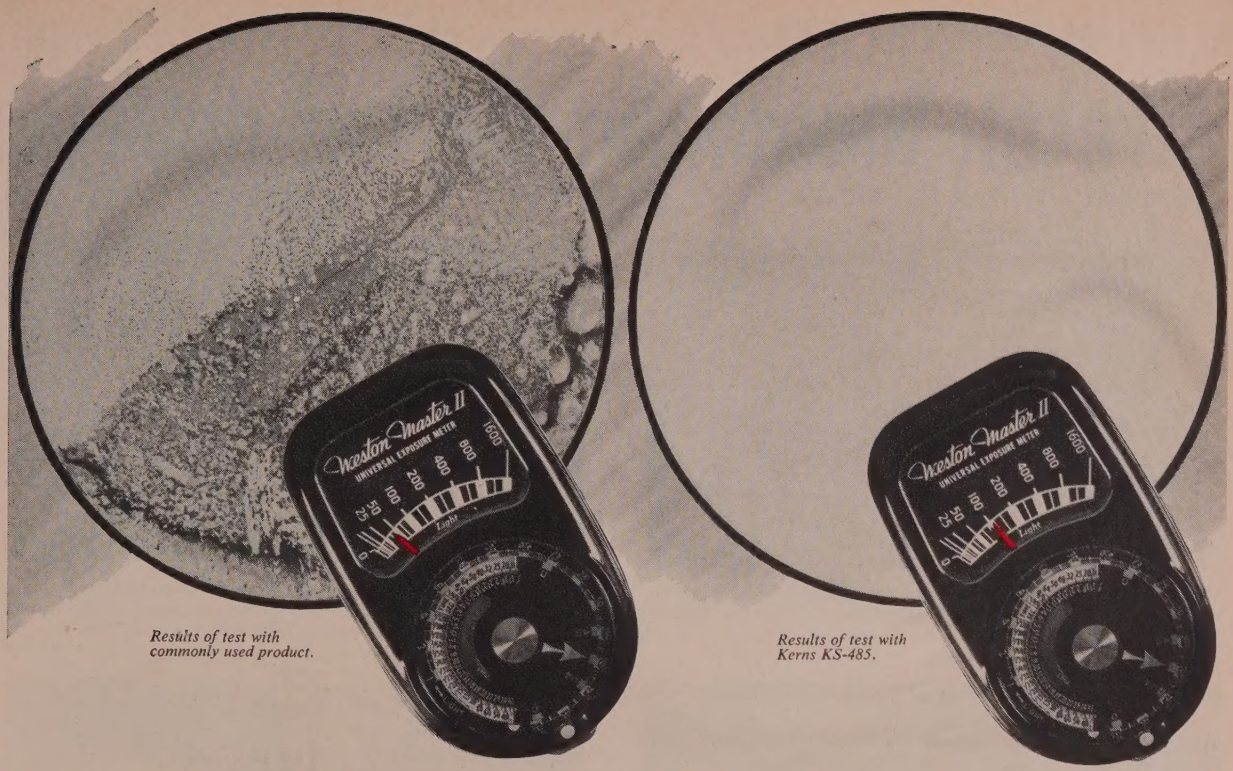

Results of test with commonly used product.

Results of test with Kerns KS-485.

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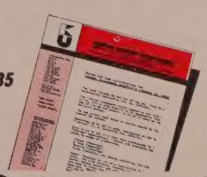

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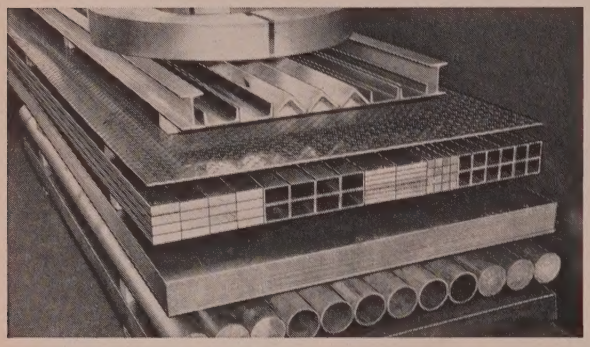

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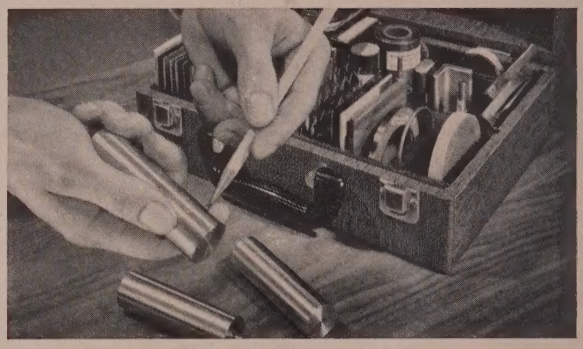

HELP IN SELECTION—Your Ryerson representative is Metalogics-trained to help you choose the best aluminum alloy for each application . . . and to assist you with fabrication problems.

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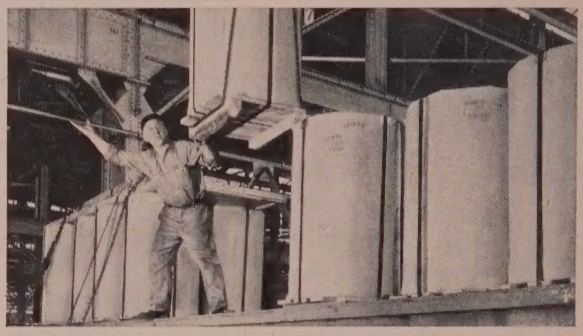

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MODERN METALS
Read in companies that produce, fabricate and cast aluminum, magnesium and titanium, and firms that use these metals in manufacturing end products.

ON THE COVER: This is the one-year-old New Orleans Public Library. Surrounding the upper portion of the building is an aluminum solar screen which serves three purposes. It cuts the glare of sun all year around, slashes the air conditioning tonnage needed, and provides a beautiful, modern facade. Such a screen, providing an esthetic reason for its being as well as a functional one, says there's a future for this type of architectural product. See article on page 32 for fabrication and installation details.

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Modern Metals has by far the world's largest circulation among light metals fabricators, foundries and product manufacturers who use aluminum, magnesium, and titanium. Circulation: Now over 15,000 copies per month. Acceptance under controlled circulation at Barrington, Ill.

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PUBLISHER W. B. GRIFFIN

Modern Metals

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Letters

Fastener Feature Coming

Sirs:

We have your letter of September 6th about aluminum and fasteners. While we use no aluminum, we would greatly appreciate two copies of what promises to be a very comprehensive report. Any nominal charge will, of course, be satisfactory.

"H"—Illinois

MM—This refers to a letter we sent to 2000 plants regarding their use of fasteners in manufacturing aluminum end products.

We also queried about 100 fastener manufacturers. (Mr. "H", it seems, makes nails out of that old-fashioned metal.)

Our detailed questionnaire has already pulled a 20% response. The replies are constructive; should help manufacturers do a more efficient job. We hope to have the complete report ready for the December issue.

To those who took time to answer our questionnaire, our sincere thanks.

Ceiling Grid Systems

Sirs:

Where can we purchase metal grid systems for suspended ceilings in small quantities?

"N"—North Carolina

MM—A number of firms make them, but we don't have such a list.

However, one we know of (see MM, May '60, p. 74) is Southern Extrusions, Inc., Magnolia, Ark. This aluminum extrusion and finishing plant has developed a system that is meeting good acceptance.

Pricing and Competition

Sirs:

I am sure by now many others have complimented you on your September issue. The copies you sent to the extruders group in Philadelphia were excellently received—and, I believe, educated the independent on the matter of price-cutting, and the producer on the matter of extended credit.

Maybe new hope can be found in the recent losses the prime producers are taking where they have extended unwarranted credit to the worst price cutters in the field. . . .

"W"—Texas

Sirs:

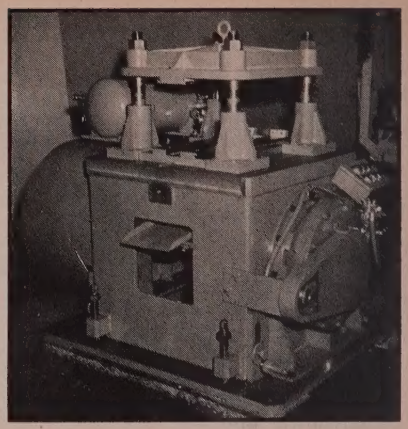
Let me say you people are doing a big job when you dig out details and editorialize on the problems facing this industry. I know that you are frequently alone in publishing this because the majority of magazines are too concerned about what their advertisers may think.

As a supplier to the building industry, four years ago we found ourselves being swayed by competitors and cutting prices to meet them to the point where we were giving our product away.

Finally, we held a meeting which lasted two days. Every department manager had his say; then he was questioned. It was very unpleasant for us all. When it was over we decided to increase prices a flat 10%, and so advised every customer. During the following 12 months, we lost $1.5 million of business. The next year our profit picture went back to what we consider normal, and it has stayed there. We never made a better move. . . .

"T"—Illinois

MM—When a subject merits front cover treatment, that's where it goes. While we would much rather write about progress,



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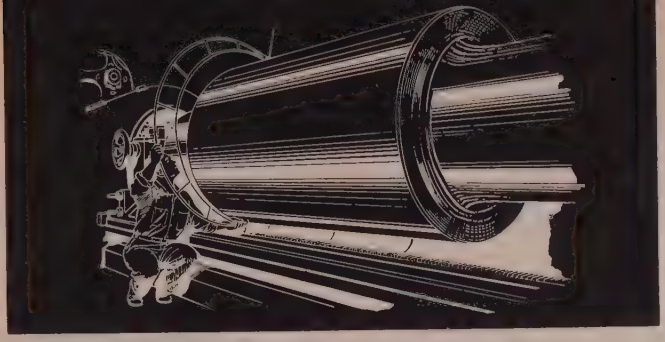

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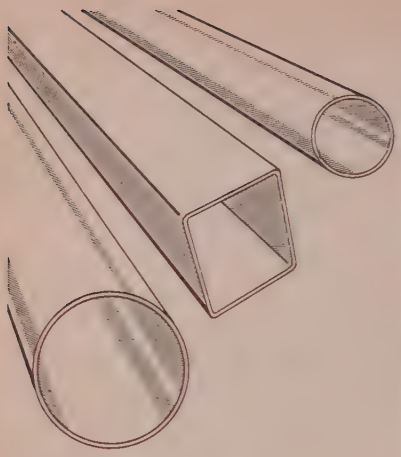

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we don't hesitate to reveal harmful things — such as unprofitable aluminum prices — when it's warranted. Furthermore we believe Modern Metals' advertisers, like our readers, are aware that we try to be objective. They very rarely try to dictate editorial policies.

On Welding Aluminum

Sirs:

Those continuing articles you've been publishing on how to weld aluminum are as complete, as technical, as anyone would want. . . .

If reprints will be available, put this department down for five copies. . . .

"M"—Michigan

MM—This issue contains Part 6 of our "Welding Aluminum" series. We estimate there'll be five more installments.

We will reprint the series into what will be about a 50-page job. Copies will be available at $1.00 apiece, next spring. By the looks of the early response, it'll be a sellout.

By the way, a new aluminum welding development is reported in this issue (page 52).

Wants Porous Metal

Sirs:

I am interested in finding out the names of companies producing porous metal in sheet form. By porous metal, I mean sintered brass or something similar.

The rough specifications I am interested in are as follows:

Metal — aluminum preferred, but any metal or alloy is acceptable.
Thickness — 1/8" or greater.
Size — 2 ft. x 2 ft. or greater.
Porosity (approx.) — enough to pass .2 cu. ft. of air in 5 seconds or less at a differential pressure of 2" of mercury.

I do not care what manufacturing or fabricating method is used to make the sheet.

"J"—California

MM—We give up. Maybe you could use the "foamed" aluminum developed by Bjorksten Laboratories in Madison, Wis. If anyone making porous sheet metal wants to contact "J," we'll gladly forward the correspondence.

Wants Roll Formed Shapes

Sirs:

We are in the market for purchasing a large quantity of custom roll formed shapes.

Would you please advise us of any firms you know of who provide this service.

MM—Our light metals buyers directory, published three times a year, lists a number of fabricators that produce aluminum roll formed shapes. The final directory for 1960 is in this issue, (page 102). We've sent you a copy of the last directory; have a few left for any reader who can use one.

Finishes For Aluminum

Sirs:

It is our understanding that Modern Metals has published a series of articles on cleaning and finishing aluminum, and that reprints are available. If this is the case, send us three copies together with the charge. . .

"T"—Minnesota

MM — Last September we published an entire issue on the subject and put it together in a 36-page reprint. We had 15,000 copies printed, and the last of them were sold last month.

The fact that the demand was still brisk a year after the reprint appeared, encouraged us to reprint an additional 3000. So copies are again available at $1.00 apiece. If you order more than ten copies, the price drops to 50c each.

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After other extruders tell manufacturers it can't be done, General Extrusions often steps in and says, "can do." This is why more and more of the nation's leading manufacturers are going directly to GEI with aluminum extrusion projects that call for complicated shapes with critical tolerances and wide variations in wall thickness.

They know that GEI's staff of experienced engineers and precision craftsmen will, routinely and promptly, come up with the answers. An example is the Class Three hollow shape (six hole extrusion) shown right. In the past this part, used by a radiator manufacturer, was extruded in half holes and the sections welded together. GEI extrudes it in a single piece . . . saving time and money. The circular extrusion with V-shaped inside walls replaced a casting, with considerable savings to the manufacturer.

TOP USERS ALSO PREFER GEI ANODIZING AND FABRICATION

GEI'S top position in the aluminum industry also guarantees speedy and high quality anodizing and fabrication. GEI is prepared to give you complete and unsurpassed service in all phases of aluminum processing, meeting the exacting specifications of the Army, Navy and Air Forces, or your own special requirements.

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Consult your classified phone book under Aluminum Products.

GEI ALSO PRODUCES STOCK EXTRUSIONS FROM MORE THAN 500 DIES ON HAND.
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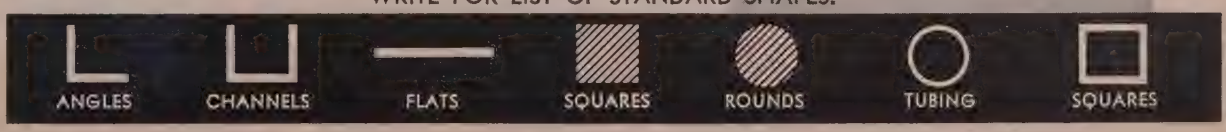

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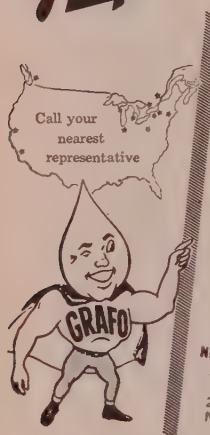

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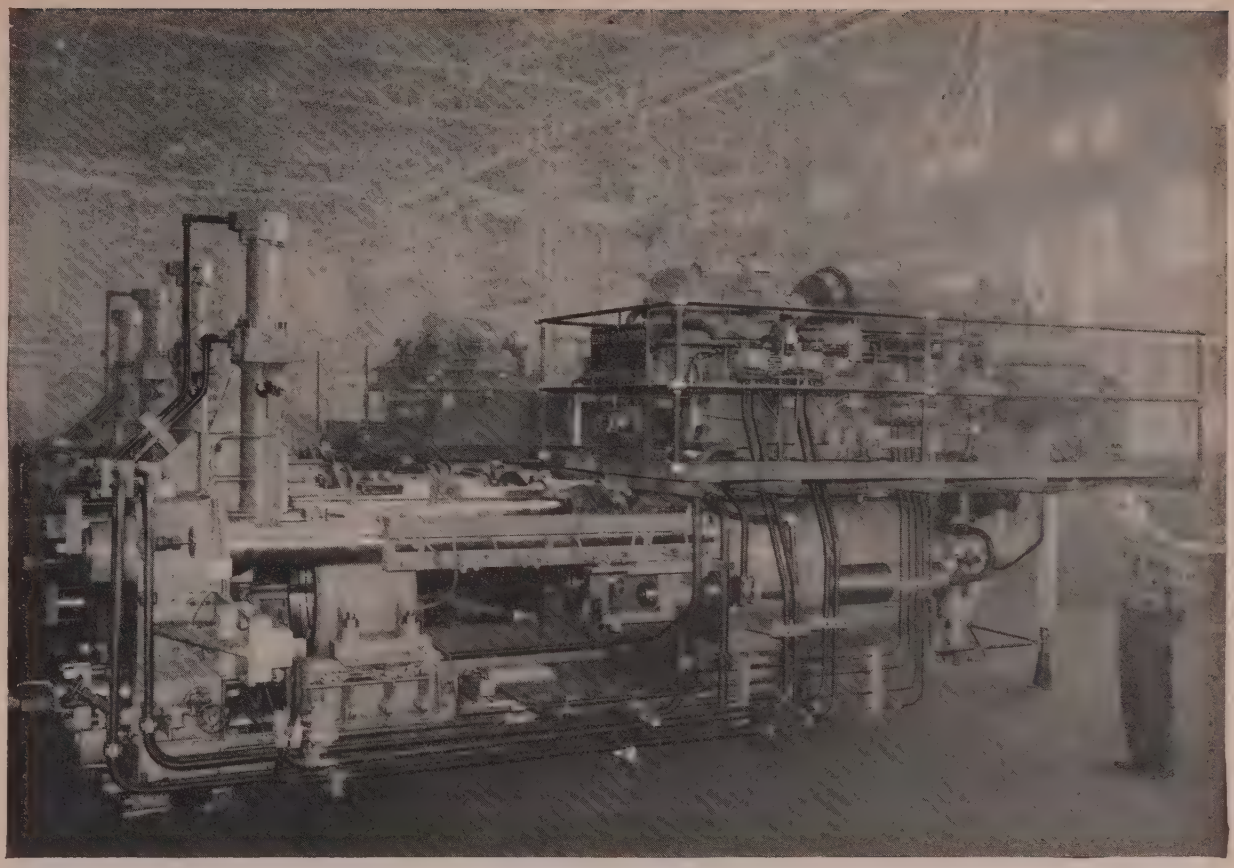
5a

Here and There

Study in Steel » » This is the name of a new promotional program which, U. S. Steel hopes, will make steel "the top design material for everything from toys and furniture to water towers and stadiums." We had always thought that the steel boys had the water tower market sewed up long ago, so we decided to dig into the two pound press kit that hit our desk late last month. We didn't find anything about water towers, but there was plenty of inspirational copy, plus photos of a pretty slick line of furniture. Seems that construction of the chairs, desks, etc., was based on a "C" leg made up of steel members welded together while under tension. The result is a combination of tension, compression and cantilever action — which, some design engineers may be mildly startled to learn, are "the three major mechanical principles required for structural efficiency." The idea seems to work in this furniture, but there was no indication that it couldn't be applied to other materials. U. S. Steel was careful to point out that it isn't invading either the design business (the furniture was designed by Peter Muller-Monk & Associates) or the furniture business. Rather, the company's aim is to "capture the attention of the design world." Considering the highly sophisticated efforts of the aluminum producers — Alcoa's "Forecast Collection," for example — the steel industry still has much to learn about promoting a basic material.

American Architects Arise » » Another outstanding example of promotion (continuing the thoughts expressed above) is the R. S. Reynolds Memorial Award, the largest design competition in the architectural profession. As most of our readers know, this award is conferred each year "on that architect who, in the judgement of his profession, has designed a significant work of architecture, in the creation of which aluminum has been an important contributing factor." Administered by the American Institute of Architects, the award was established four years ago by the directors of Reynolds Metals Co. in memory of the firm's founder, the late R. S. Reynolds. The winner gets $25,000, plus an original piece of sculpture created by a prominent contemporary artist. Perhaps more important is the flood of publicity he gets in architectural magazines throughout the world. European architects have copped the prize four years in a row; an American winner is long overdue. The AIA is now accepting nominations for the fifth award, and, for the first time, is encouraging the nation's press and broadcasters to nominate local architects whose buildings are eligible (completed between January 1, 1958 and January 1, 1961). So if you know of an architect whose work uses aluminum creatively, nominate him. Information needed includes: Architect's name and address, name and location of the structure and date it was completed, and name and address of the person making the nomination. Send this to: The Reynolds Award, AIA, 1735 New York Ave., N.W., Washington 6, D. C.

(*Continued on page* 18)



Battery of Loewy 1500-ton extrusion presses, piped and wired on the erection floor before shipment to customers' plants

New workhorse for prime and secondary window industry...

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Here is an extruder that specifically meets the requirements of suppliers to the architectural and building trades.

Recent installations of B-L-H's new oil-hydraulic self-contained Loewy 1500-tonner—the only press with all alignment adjusting points located externally—show:

- **Enhanced flexibility in range of extruded product**
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Our presses come completely piped, wired, and, if desired, equipped with furnace and auxiliaries.

Write Dept. D-10 for detailed information on this new Loewy model and discuss with our engineers—without obligation, of course—the savings you can realize with it. Should you be considering the construction of a new extrusion press installation, you may want to take advantage of our free consulting service, which covers everything from plant planning to full operation.

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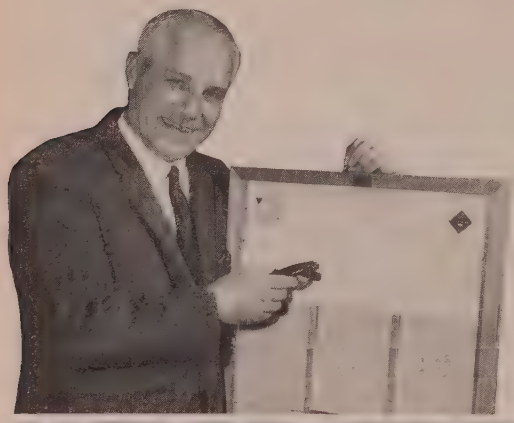
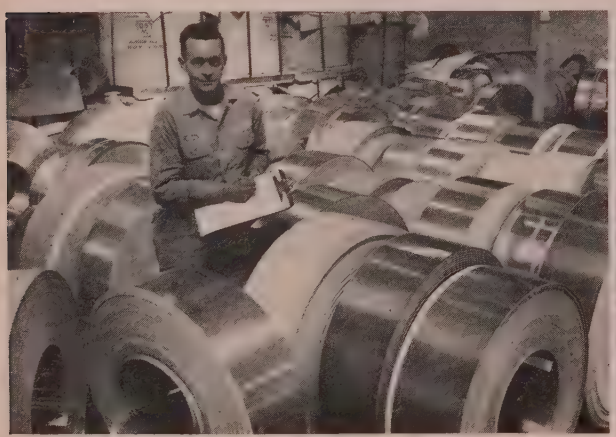
"Not one dime spent on Metal Products "for the Amchem-



CAMPCO's Executive Vice-President W. H. "Bill" Chapman sums it up—"Every time I turn around we save money in operations. Haven't spent a dime on maintenance on the new system, yet the coatings are more uniform by far. We've found that Alodine 1200S is what makes the big difference in roll coat operations." At left, "Bill" Chapman points out samples of CAMPCO-produced aluminum siding. Note Alcoa aluminum trademark and Alodine seal, both used prominently in CAMPCO's sales and promotional activities.

Aluminum strip enters first stage of Alodine prefinishing process, the Ridoline 34 cleaner spray chamber. Four of the five Amchem processing stages at CAMPCO are spray-type chambers.

This 27-foot long Alodine immersion tank is responsible for CAMPCO's dramatic increase in production and quality as well as reduction in labor, downtime, and fuel savings as compared to their previous all spray system.



Painted Alodine-treated aluminum strip, ready for shipment to commercial customers, is checked by Steve Wilson, Siding Department Supervisor, of Carolina Metal Products.

Alodine-treated end products at CAMPCO include aluminum reflectors used in street lighting. Many Alodized products are used in the nation's highway program—traffic signs, highway markers, license plates, etc.

Maintenance" says Carolina Designed Spray-Dip Process!"

New Maintenance-Free System for Aluminum Pre-Finishing Made Possible by Amchem's Alodine* 1200S

Dynamic Coating Process

They're making roll coating history down South, thanks to Amchem's Alodine 1200S! North Carolina based CAMPCO, one of the country's top strip processors, is gaining higher quality and greater output with a maintenance-free, Amchem-developed chemical conversion coating system for continuous-strip prepaint treatment of aluminum. Heart of the system, a 27-foot Alodine 1200S dip tank introduced into CAMPCO's former 5-stage Alodine spray metal preparation line.

New Design Cuts Operating Costs

The basic simplicity of dip tank design started CAMPCO off with a low initial capital expenditure and has resulted in significant day-to-day operating savings. The dip phase eliminates atomizing of strong acid materials and the need for pumping them through intricate piping systems, entirely eliminating nozzle clogging. In addition, machine exhaust requirements have been simplified and pump maintenance eliminated.

Savings Add Up

Additional CAMPCO savings with Alodine 1200S continue to pile up. Line speeds have been increased over 25 percent, fuel savings cut up to 30 percent, bath start up time greatly reduced. As "Bill" Chapman says, "I wish all of our problems were solved to the extent our prefinishing problems have been solved."

Join our growing list of satisfied users. If your product is made of aluminum—make sure it's protected by Alodine, the industry's standard and original prepaint treatment.

*Amchem's registered trademark for its aluminum chemical conversion coating.

Send for Booklet 1424A describing uses of Alodine for prepaint and protective treatment of aluminum.

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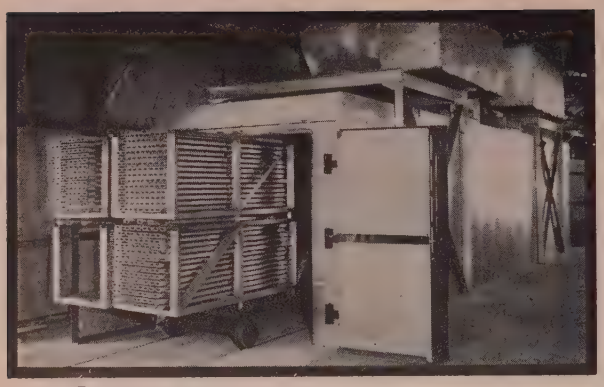

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New Market, New Contention « « Imagine sitting in a waiting room at the airport, waiting for your jet flight to be called. Suddenly, the room starts to move, and it dawns on you that you're on your way to the plane, parked at the head of a runway some two miles from the airport building! That's what the jet age is doing to airports, adding another complexity to air travel, but at the same time opening up another application for aluminum in the transportation field. If aluminum can snag the business, that is; because airport lounge cars are at the moment a bone of contention between the light metal and stainless, and stainless has won the first round. Budd Co. has an order for a few of the new rolling waiting rooms for use at Dulles International Airport, the big new jet field at Chantilly, Va. that serves Washington, D. C. Budd Co., based in Philadelphia, had more than a slight advantage in getting this job away from some of the other big fabricators. It also makes us think of a disadvantage with which aluminum must regularly contend: A big fabricator like Budd Co. is so strongly oriented toward stainless. Who, in the heavy fabrications business, feels this way about aluminum?

New Extrusion Use? » » An interesting application of simple extruded aluminum shapes is the plastering and containment trim used throughout the U. S. embassy building, now nearing completion in London, England. Our information is skimpy, but we get the impression that some 15 to 20 different extruded shapes are used to serve as trim for plastered walls, tile walls, wood panelling, and the like. Example: Where a door frame abuts a plastered wall, a neat appearance and close dimensional tolerances are achieved by leaving a recess at the junction of the jamb and wall. Extruded trim, attached to the wall before plaster is applied, serves as sort of a "dike" to contain the plaster in a neat, straight line. We understand that nearly 26,000 linear feet of extrusion went into this one application. Something for some enterprising extruder to look into. Incidentally, this is the building that sports that huge gold eagle that has ruffled the sensibilities of so many Londoners. Designed by sculptor Theodore Roszak, the bird has a wingspan of 35 feet; consists of formed aluminum sheet sections, welded and bolted together.

Hot Market: Farm Buildings » » Last year the nation's farmers spent more on buildings than on trucks, tractors, and autos combined, and more than on any other major machinery or equipment. So says Lane Palmer, managing editor of Farm Journal. It added up to $1,752,000,000 worth of farm buildings — a respectable market no matter how you look at it. "The farm building market has become so hot," reports Palmer, "that manufacturers of packaged steel buildings are moving in at top speed. One steel building outfit has begun licensing dealers to sell only to farmers, apart from his industrial sales group — it's that important." Wonder if the aluminum prefab building industry will be able to match the zeal of those steel guys.

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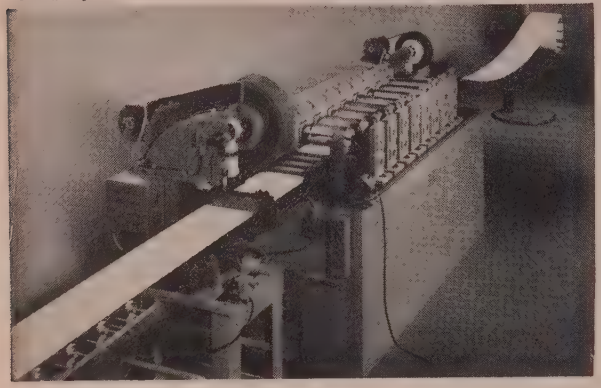

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Useful Data

Welding, brazing and soldering alloys and fluxes are cataloged and instruction on use of each given in manual by All-State Welding Alloys Co. Charts and tables summarize alloy selection and properties. Shortcuts, hints, chemical composition and data on automatic and semi-automatic welding are given. For copy, write R. H. Mandel, All-State Welding Alloys Co., Inc., 249-55 Ferris Ave., White Plains, N. Y.

Stock dies for aluminum extruded shapes, rods and bars are listed and diagrammed in a new catalog by General Extrusions, Inc. Over 700 dies are included in booklet, and General has 500 additional dies available. Information includes die number, dimensions, weight per foot, factor and type of corners. For catalog, write Fred Schuler, General Extrusions Inc., 4040 Lake Park Rd., Youngstown, Ohio.

Fabrication facilities, capabilities and some magnesium and aluminum products produced by the Fabrication Division of Dow Metal Products Co. are described and illustrated in brochure 141-221. Listed are operations the plant can perform and equipment it has to do the job. Contact William H. Gross, The Dow Metals Products Co., Midland, Mich.

Fired refractory brick is detailed in bulletin RB-20 by Richard C. Remmey Son Co. The refractories include semi-silica, high heat duty, high alumina, and super refractories including mullite, 90% and 99% alumina, zircon and silicon carbide. Properties and applications of each brand are presented to aid in selection of correct refractory for particular job. For copy, contact Richard C. Remmey Son Co., Hedley St. and Delaware River, Philadelphia 37, Pa.

Crucibles for melting and holding aluminum, made of Alumelt, are subject of a data sheet. Alumelt is a refractory composition tailored specifically for aluminum operations, and should be used for temperatures up to 2400°F. Firm developed Alumelt crucibles to replace the line of silicon carbide crucibles it formerly produced for aluminum melting industry. Firm lists nine reasons why new crucibles were accepted by industry as a replacement for conventional types. Request copy from Ben R. Shipley, Vesuvius Crucible Co., Swissville, Pa.

Vibratory finishing equipment suitable for practically all nonferrous and ferrous metals — castings, forgings, stampings, machined or pressed parts — is detailed in Pangborn News. Firm claims new units, when used with proper media, are able to reach shielded areas and concave recesses. Pictures and other facts of units are included. White Vibratory Finishing Div'n, Pangborn, Hagerstown, Md.

Aluminum screw machine stock of Reynolds Metals is detailed in booklet DR 22a-25. Several tables are included covering cost factors, screw machine proper-

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A white egret sails through Albert Schweitzer's village of Lambarene, in this remarkable photograph by W. Eugene Smith.

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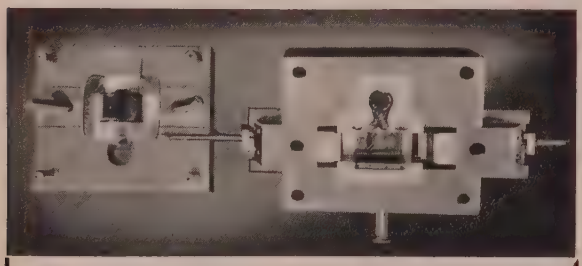

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ties of various alloys, chemical composition limits, mechanical and physical properties of rolled or cold-finished aluminum rod. Other information includes description of color code system and points to remember when machining aluminum. Request copy from Reynolds Metals Co., Richmond 18, Va.

Double chamber dry hearth aluminum melting and holding furnaces are detailed in Hevi-Duty bulletin 594. Three types of furnaces are covered: Type DCT for permanent mold and die casting; type DCR for high-volume production; type DCB for pouring large aluminum sand castings directly, or transferring molten metal. Specifications and dimensions are given in tabular form for all types. Copy can be obtained from Marshall H. Smith, Hevi-Duty Electric Co., 304 Hart St., Watertown, Wis.

Casting alloys are subject of reprint by Olin Aluminum. Nominal compositions of 15 alloys offered in standard pig, available in 10, 25 and 50 pound sizes, are given. Standard alloy ingot is also listed. For copy write Gayle Maile, Olin Mathieson, Metals Div'n, 400 Park Ave., New York 22, N. Y.

Kentucky's importance to the aluminum industry is outlined in a report published by the state. Subjects covered include requirements state fulfills for supporting aluminum processing plants; electric power; fuel; transportation; markets for aluminum; advantages the state offers for aluminum industry expansion. Also included are maps showing mineral deposits, electric power service, transportation, etc. Book can be obtained from Wilson W. Wyatt, Lieutenant Governor, Lieutenant Governor's Office, Frankfort, Ky.

Heat treating furnaces are detailed in Sunbeam Metal Minutes. Included are units for annealing, tempering, and stress relieving; continuous atmosphere hardening and carbonitriding of small parts such as fasteners; continuous atmosphere carburizing, carbon restoration, normalizing and hardening. Temperature ranges and sizes for all units are given. Ask for Vol. 19, No. 3. Write R. K. Stephenson, Sunbeam Equipment Corp., 180 Mercer St., Meadville, Pa.

Insulated riser sleeve for nonferrous castings, Ris-A-Sleev, is described in a Johns-Manville bulletin. Pictures and tables demonstrate how the sleeve "improves castings by reducing heat loss from molten riser metal." Physical data given includes composition, density, linear shrinkage, thermal diffusivity, dimensional tolerances and transverse strength. Ask for copy of IN-247A when writing Johns-Mansville, 22 East 40th St., New York 16, N. Y.

Emission spectrochemical instruments, their basic principles of operation and typical applications, are briefly described in Baird-Atomic booklet. Included is discussion of a complete 3-meter grating spectrographic laboratory, directtrograph. For copy, write Charles Russell, Emission Sales Dept., Baird-Atomic Inc., 33 University Rd., Cambridge 38, Mass.

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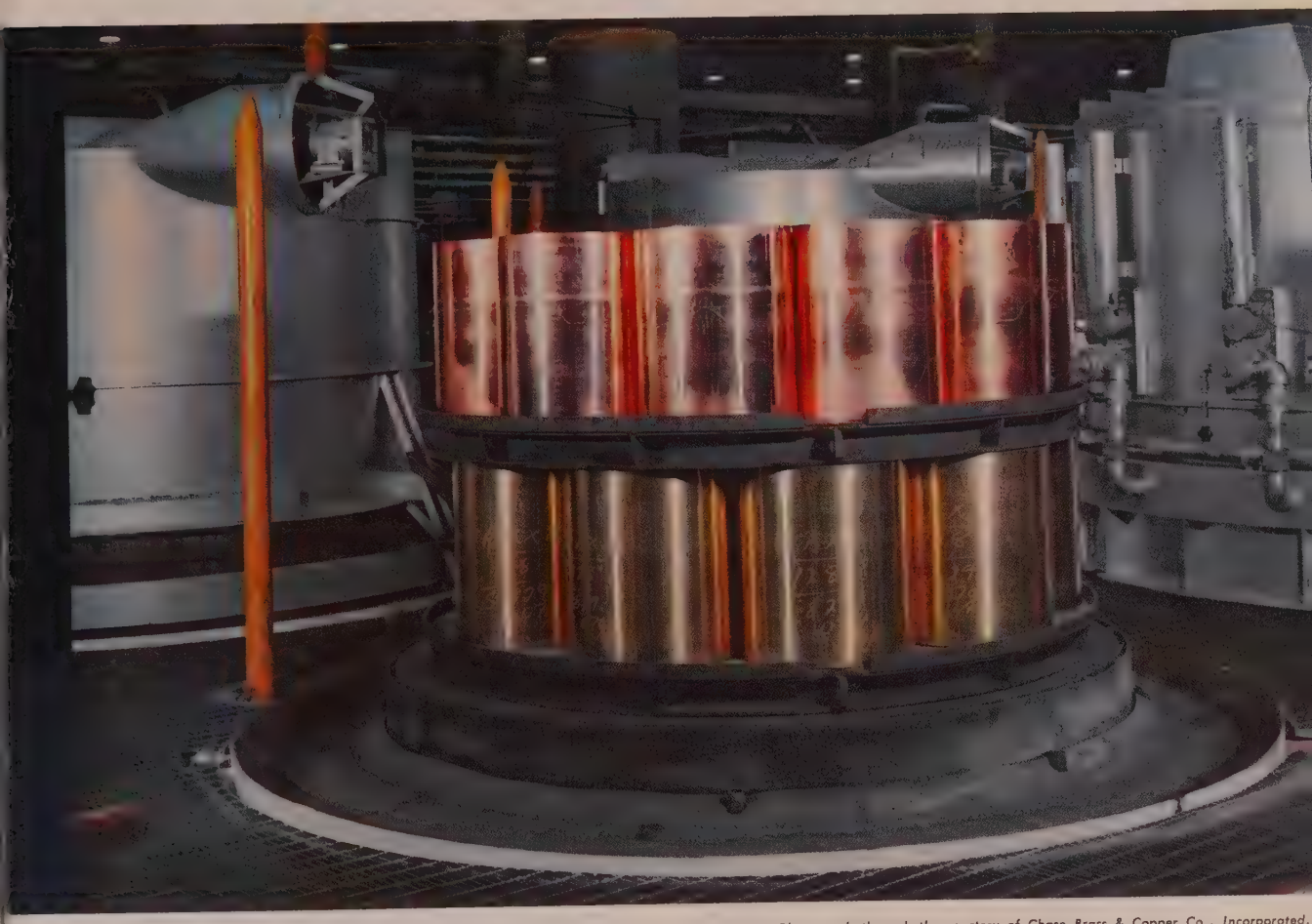
of Aluminum, Copper and Brass, the leaders prefer

Lee Wilson* HIGH CONVECTION FURNACES



Photograph through the courtesy of Chase Brass & Copper Co., Incorporated.

● Really bright clean annealing of copper, brass and aluminum is now an everyday reality because of the Lee Wilson High Convection System for non-ferrous metals.

This mixed charge of copper and brass has been brought to a specified softness without affecting its surface condition. This means less finishing for the fabricator, and a greater desire for this producer's product.

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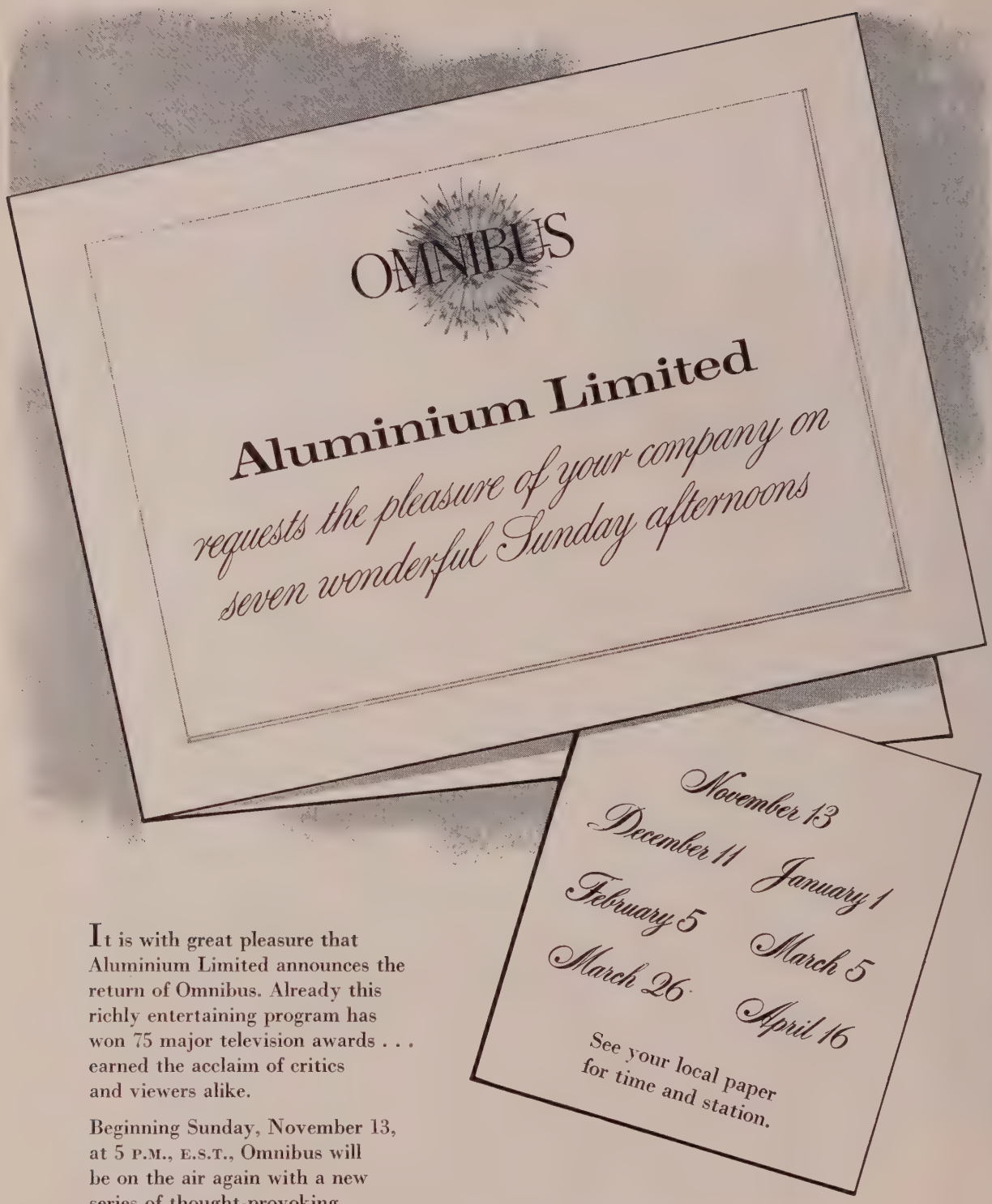

It is with great pleasure that Aluminium Limited announces the return of Omnibus. Already this richly entertaining program has won 75 major television awards . . . earned the acclaim of critics and viewers alike.

Beginning Sunday, November 13, at 5 P.M., E.S.T., Omnibus will be on the air again with a new series of thought-provoking pieces . . . brought to you for the 6th season by one of North America's great aluminum producers. Aluminium Limited Sales, Inc., 630 Fifth Ave., New York 20, N. Y.

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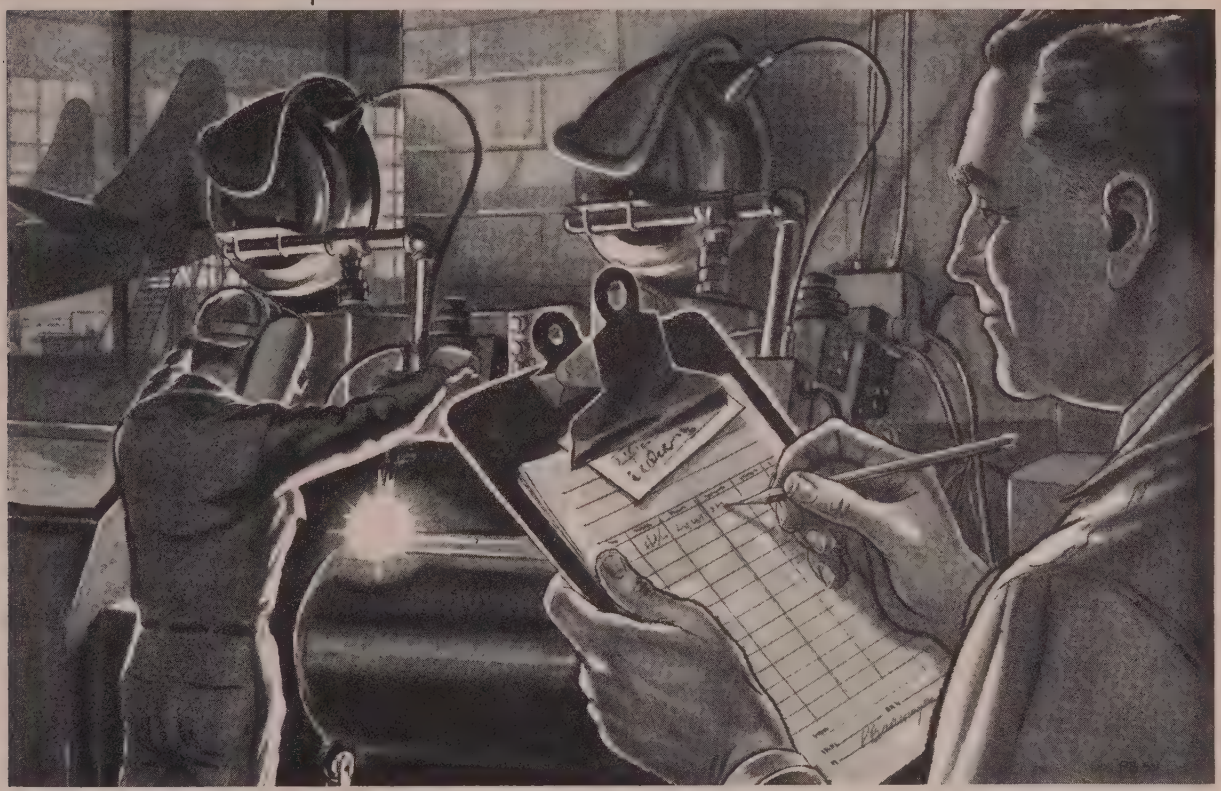

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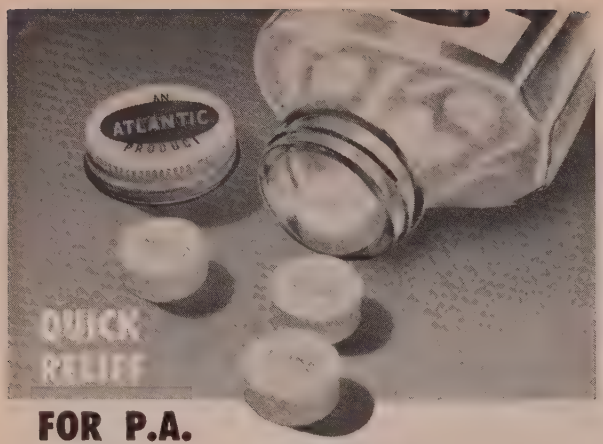

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Polished 1-inch aluminum tubes frame the **outdoor furniture** line — Sun N'Sand — of Vincent-McCall Co., Kenosha, Wis. Line includes double seat-gliders, stack chairs, adjustable posture chairs and chaise lounges. Webbing is of Saran which comes in five colors.

Portable folding tables, chairs and ladders are made of aluminum by Universal Converting Corp., 417 Sawyer St., New Bedford, Mass. Main users of arm and bridge chairs and 2½ by 6 and 2 by 5-foot tables are schools, offices, churches, clubs, etc., says manufacturer.

Aluminum and fiberglass, arch rivals in some industries, have been combined by Frantz Mfg. Co., Sterling, Ill., to make **overhead garage doors.** Doors are framed with aluminum extrusions while main area is translucent fiberglass in yellow, white or coral.

Roof **cupola,** with choice of weathervane — horse, sailboat, rooster, anchor — is a lightweight unit made of aluminum by Garland Mfg. Co., 10533 Gratiot Ave., Detroit. Unit is 31 inches high and 24 inches square, has a white body and a copper-colored dome.

The Convair *Hustler,* new **supersonic bomber,** uses aluminum honeycomb sandwich for major airframe and sub-system components. An example is the parabolic radar reflectors for the B-58 Bomb-Nav system. Parts were fabricated to curvature tolerances of ±.005 inch by Aeronca Mfg. Corp., 1714 Germantown Rd., Middletown, Ohio.

A low iron manganese additive for use in wrought aluminum alloys has been developed by Vanadium Corp. of America, 420 Lexington Ave., New York. Called Vancoram, it will be used mainly for producing 3003 and 3004 alloys, but will have limited application in the production of alloys for sand, permanent mold and die castings.

For duffers haunted by hooks and slices, Modern Golf Enterprises Inc., 4 Taft St., South Norwalk, Conn., has developed the Tommy Armour **Golf Tutor.** It uses three pins on an aluminum framed plate to indicate swing faults. As golfer swings the pins are knocked down, showing the direction of follow-through.

Fluorescent **post lantern** made by A. M. Andrews Co., 4621 S. W. Beaverton Highway, Portland, Ore., uses 3-inch diameter welded, pebble grain embossed tubing and an aluminum stamping for the base. Body of the lamp is formed of plastic. In spite of the modern materials, lamp design carries one back to the days of coal oil and lamp lighters.

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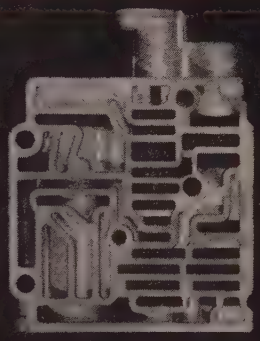

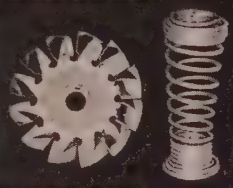

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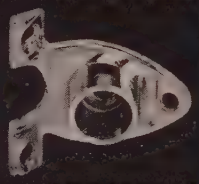

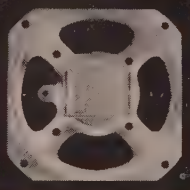

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is another company that has moved to the **pleasure boat** field to diversify. They're tooling up to make aluminum boats, starting during the 1961 season. A Reynolds-developed stretch forming process will be used in hull-making in several sizes.

Half a dozen prototypes of a motorized **snow sled** have been constructed entirely of aluminum by Polaris Industries, Roseau, Minn. Sno-Traveler is driven over the snow by metal slats which are in turn driven by two loops of roller chain connected to a Kohler engine. Speed is much greater than a dog team's.

A material **level control** for installation on bin walls has a cast aluminum housing and cover. Made by Syntron Co., 410 Lexington Ave., Homer City, Pa., the diaphragm-actuated Hopper Level switch is 7 inches in diameter, will start or stop flow of a material as needed.

Bowmar Instrument Corp., 8000 Bluffton Rd., Fort Wayne, Ind., broadens the application range of its longitudinal **counter** with an anodized (black) aluminum housing and drum. Model 10468 gives longitudinal indications adding from 000 degrees, 00 minutes to 180 degrees, 00 minutes in West presentation then transfers to East presentation and subtracts to 000 degrees 00 minutes. Unit is designed for continuous operation at 500 rpm; intermittent operation at 1000 rpm.

Mothers like the H. J. Heinz baby food package because of the Alcoa-designed Flavor-Lok **food cap.** Rapidly rising sales of the Heinz line has been an important factor in the decision of Alcoa to expand its Richmond, Ind. closure plant. It will be the third major expansion in less than three years. The present expansion affects the Flavor-Lok cap, and the Pilferproof closures for wines, liquors and other products. Going into the plant will be new color-coating machinery for decorating aluminum sheet, additional shears, gas lines, and air compressors.

One-sixteenth-inch thick drawn aluminum, 6 inches high by 3 inches wide, is given a 1⅛-inch draw for a 100-milliwatt crystal-controlled **radio-phone** made by Morrow Radio Mfg. Co., 2794 Market St., Salem, Ore. Operating on any one of the 22 channels of the citizens' band, the radio is fully transistorized and self-contained with exception of the lapel microphone.

Pittsburgh Aluminum Alloys, Inc., Murrysville, Pa. is entering the **custom extruding** business. The company has a new Loewy 1500-ton press for this work, housed in a new 60,000 square foot plant. Formerly the firm produced aluminum extrusions for its own door and window products under the name of B&G Mfg. Co. Eugene S. Cohen, vice president, said, "With over 15 years' experience, we were able to foresee the need for additional custom extrusion services." He said the new press, capable of producing extrusions up to six inches in cross section, will "more than double previous extrusion capacities in the 6000 series of heat treated and non-heat treated alloys. Auxiliary equipment includes a new Magnethermic induction billet heater, walking beam run-out tables, quench tanks and a 15,000-pound capacity ageing furnace.

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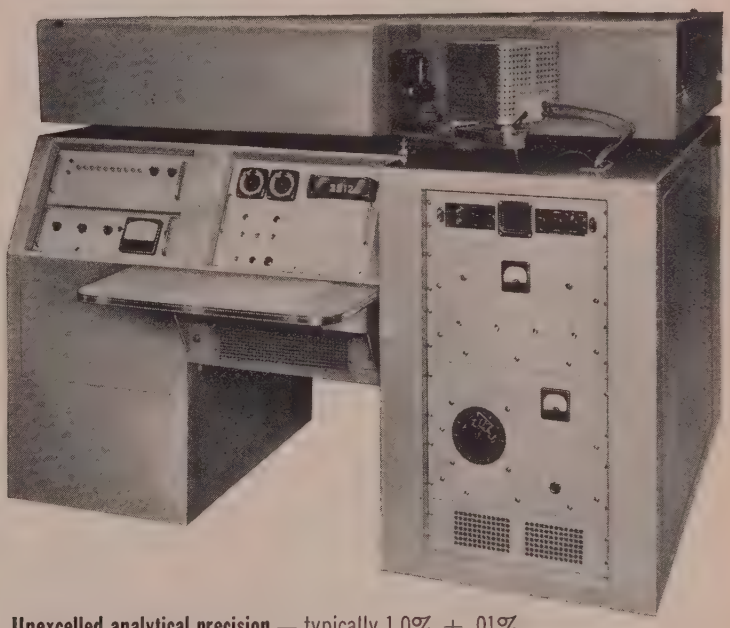

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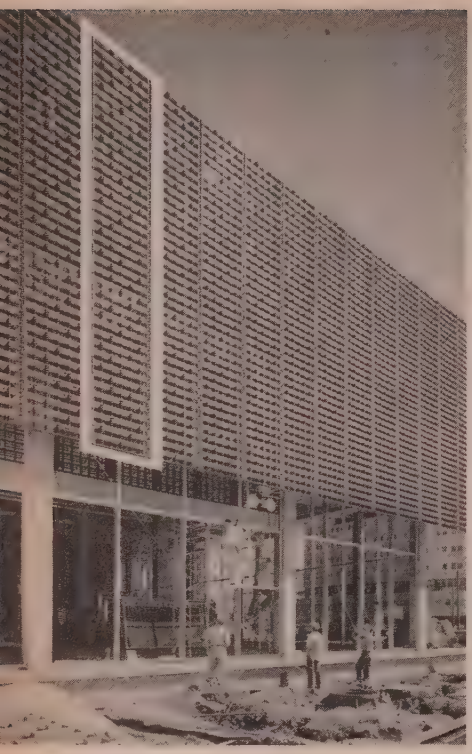

SOLAR SCREEN DOES TRIPLE DUTY

Handsome aluminum shell around new library says there's a future for this type of architectural accessory — for esthetic or functional purposes, or both — for new buildings and tired old ones.

By Sidney J. Folse, Jr.
Curtis & Davis, Architects, New Orleans

■ ***Two 13-foot x 4-foot wide egg-crate panels with overlay are bolted together at Library construction site to form 26-foot high solar screen section.***

THE CURTAINWALL design for the New Orleans Public Library was generated by a single concept stipulated by the Librarian: The building should be a department store for books, whose showcases would be the walls of the building, with the interior of the library the constantly changing display.

The concept was well founded. The building is located within a square of the Canal Street shopping district, heart of the city's retail merchandising. For the library to be successful in merchandising *its* wares it would have to display them as imaginatively and forcefully as the nearby shops and department stores.

Faced with an all glass building, the problem of design resolved into one of finding a solar control device which would satisfy the following conditions:

1. Protect the glass walls from direct solar radiation during the summer to reduce air conditioning load.

2. If possible, be an effective sun screen throughout the year, obviating the need for venetian blinds or drapes. To accomplish this, the sun screen would have to be effective from 9:30 a.m. until sunset on three different orientations, year-round.

3. Provide diffused glareless light.

4. Allow sufficient visibility to retain the openness characterized by the design concept.

5. Be an esthetic solution to the facade design.

Research indicated that a custom designed solar device was needed. Drawing on a local heritage of ornamental iron screens, it was conceived that a similar treatment in depth could be designed in the modern idiom — a functional accessory possessed of its own distinctive beauty.

Since the screen was to cover most of the facade, scale and visibility were the first considerations in fixing the aperture size and depth. To achieve this painstaking tests were made, using half-size wood models and a heliodon, a device to measure shadows.

Something Else Needed

After several tests, a regular egg-crate of 8-inch squares having a 6-inch depth was elected. This design offered simplicity of fabrication and inherent strength; it was tested to determine the amount of sun penetration and it was found that while the verticals were effective for all conditions, the spacing of horizontals was too great.

To correct this, and to provide a secondary rhythm in the screen, an overlay was designed to be mounted on the outer face of the egg-crate. This was simply two small horizontal louver blades crossing each of the squares near the top (see illustrations). This reduced the spacing of the horizontals.

To relieve the mechanical appearance of the system, the horizontal blades of the overlay were interrupted and several of them connected vertically to form an irregular tracery over the surface of the egg-crate. Where the horizontals are interrupted the sun's rays are trapped by small horizontal fins notched into the rear of the egg-crate. All of the sizes, spacings and depths of members were determined accurately by the heliodon. The accuracy of these determinations naturally meant lower costs in pounds of metal.

At this point, all design conditions had been met except to determine if light reflecting from the surface of the screen would be sufficiently diffused to provide uniform, glare-free daylighting. In the mid-winter season when the sun altitude is low, the solar screen is not effective in preventing sun penetration. To avoid the use of drapes on this elevation of the building, a special plate glass was specified, permitting 12 to 15% light transmission, which was sufficient to remedy this condition.

On the remaining elevations, it was discovered that any color except a dull charcoal gray would cause reflections and produce hot spots with undesirable brightness contrasts. This was disappointing, since the screen had been conceived in two colors, one for the egg-crate and one for the overlay. In the final concept, this was achieved by making the screen of aluminum, anodizing the egg crate charcoal gray and the overlay in natural aluminum finish.

To reduce reflections from the satin aluminum finish of the overlay (and from adjacent buildings) to tolerate levels, glare-reducing plate glass was used. This glass, also being heat absorbing, assisted the air conditioning design

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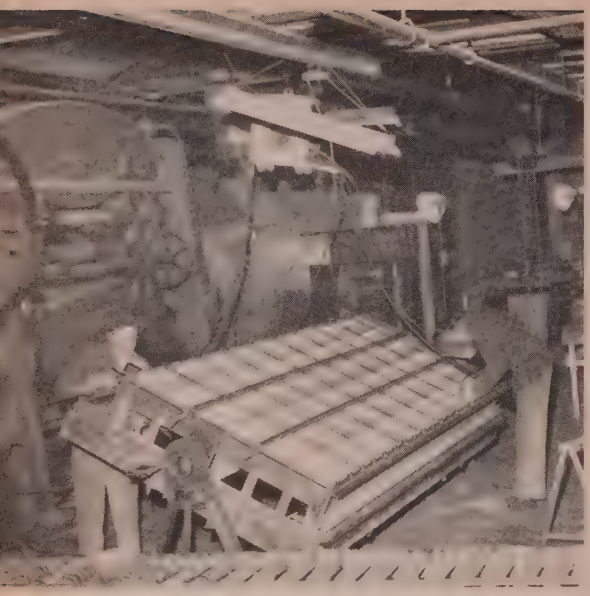


■ *Individual members of the egg-crate were sheared to size, slotted and notched, then placed in this jig which is trunnion mounted for greater welding facility. After completion of the egg-crate assembly, the pre-assembly overlay was welded to it. Anodizing of the completed panel was possible because two different alloys involved produced the desired color variation.*

from the standpoint of diffused solar radiation which might penetrate the screen.

The total wall of the library consists of large fixed glass plates in a standard alumilited aluminum, puttyless glazing bar system — with an aluminum solar screen suspended approximately 4 feet in front of the glass wall. The 4-foot module was used in plan layout, which determined the location of the solar device 4 feet beyond the centerline of columns in the exterior glass wall.

The glazing system is a Pittsburgh Plate Glass Co. design, puttyless except for the junction with concrete columns, where Thiokol was used as a sealant. Our office has adopted (as a standard) a five-year guarantee against leaks and other defects in factory designed systems. It applies for this system.

The reasons for selecting aluminum, both for the glazing members and the solar screen, was the desire to use only one exposed nonferrous metal throughout the entire project. It was also selected because of the large variety of standard architectural products available in this metal in controlled, matching finishes — from a large number of manufacturers. In the case of the solar screen, the advantages of aluminum's light weight, color possibilities, structural strength and ease of fabrication all served to reinforce this selection.

There were two problems of structural design involved in the solar screen: The screen proper, and the structural system to support the screen 4 feet in front of the glass wall. The latter called for a structural unit which would act in two directions equally well — simultaneously resisting vertical static loads and the horizontal and vertical forces of wind loads.

These conditions suggested a triangulated space frame which was found to be feasible and was utilized in the final design. Aluminum was used in the space frames because of its permanence, and because the space frames were an integral part of the design, being visible through the screen. Because of this visibility, the open web construction of these frames was also desirable from an esthetic viewpoint.

The frames were designed to span from column to column, a distance of 28 feet on the front elevations and 22 feet on the sides. They are supported by cantilever aluminum brackets bolted to the columns, to which the frames are anchored at one end, and bolted with slotted holes at the opposite end to provide for expansion and contraction. The lower space frame (second floor level) is also used as a catwalk for washing the fixed plate glass wall.

The design of these units posed no particular problem beyond the need of the designers to familiarize themselves with the properties of the structural alloys and their modified characteristics after welding. Consulting services of Aluminum Co. of America were used; the contribution made by this company through all phases of the design should not go unrecognized.

The solar screen was more difficult to analyze, the problems more varied. We had to determine member thicknesses; the size of the unit to be fabricated; provide for expansion and contraction; design splice connections; finish the screen, and devise erection methods. Such problems caused us to enlist the services of Metal Trims, Inc., Jackson, Miss.

Sizing of a basic unit for fabrication was the first step, and this was limited by the size of available anodizing tanks. It was discovered that the tanks measured 4 feet wide, 5 feet deep and 24 feet long. It was desirable to minimize the number of field splices so the largest possible unit was selected, 4 feet wide (building module) by 13 feet long (half the height of the solar screen). The weight of this unit was approximated at 250 pounds — easily power-hoisted.

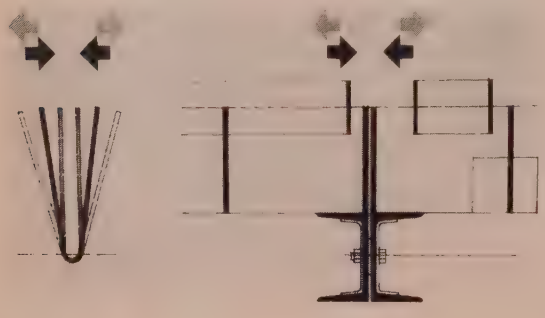
Engineering of the egg-crate structure was the next step. The obvious economical method of half notching the verticals and horizontals was selected, welded at the junction of the two notches along the center plane of the egg-crate.

Self-Strengthening Members

Thickness of the egg-crate members was a function of the 4-foot span and was determined at 3/16-inch thick. Because each member was notched half its depth, 3 inches was assumed to be the depth of the spanning members. As a measure of added safety, the horizontal bearing bars were notched toward the front of the screen, so that when deflected under wind pressure the notches would close and tighten against the verticals passing through the notches. The vertical members banding the side of each 4-foot wide unit were slotted and the horizontals were dovetailed into these slots and welded continuously.

Since there was only one horizontal splice in the 26-foot height of the screen, there were no structural problems, the vertical bars being considered as non-load bearing. Splices were ship-lapped and bolted within an 8-inch aperture so that the appearance of vertical continuity was achieved. The size of the bolts was governed by expansion and contraction acting on the two plates.

Each 4-foot wide screen unit was joined to its neighbor by structural



■ *Related drawing illustrates tongs principle of expansion and contraction of solar screen panels connected at fastening point.*

Comparative photograph illustrates the effect of PT treatment. Casting on left from standard aluminum alloy, shows typical shrinkage over a large area. Compare with casting on right cast in PT grade, under the same conditions. Alloy: F460 (319).

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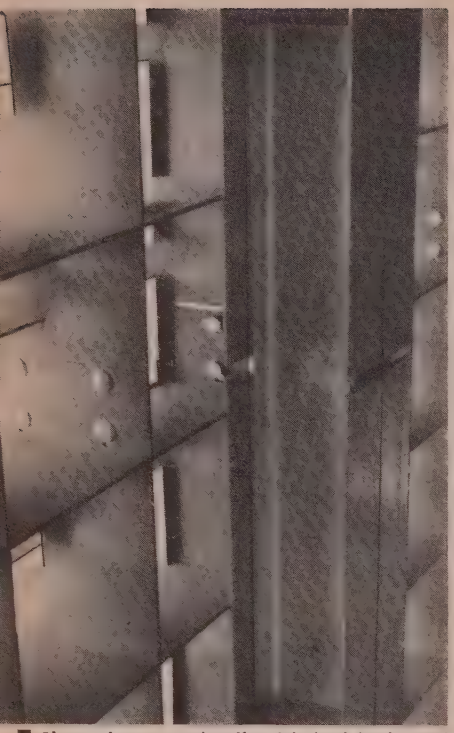

■ *Shown here are details of bolted horizontal splice in channel supports and solar screen. The screen was installed four feet from the glass and aluminum curtain wall to permit placement of a catwalk for window washing.*

aluminum channels welded to the rear of the unit at each edge. The channels of adjacent screen panels were bolted together, thus acting in unison.

It should be emphasized that the 6-inch deep solar screen panels in the plane in front of the channels were not joined—only the channels at the rear. This method of joining allows for expansion and contraction. One quarter-inch was maintained between the screen units. The distance from the outer surface of the screen to the centerline of the bolts in the channels is sufficient so that temperature displacement of the heated outer surface occurs in an action similar to the operation of tongs. Expansion of screen height is negligible.

The final problem to be solved was finishing. Our desire to have two colors at first presented a complication in the fabrication because the screen and the overlay would have to be anodized separately and then fastened together. However, Alcoa solved this problem by making available for use in the egg-crate a high silicon alloy which was just ready to be marketed. When anodized, this alloy turned dark charcoal gray as a metallurgical reaction rather than by use of a dye. Thus we were able to have our two units of contrasting color, produced in a single anodizing operation after they were assembled and joined.

At this point in the design, all of the problems involving architectural and engineering analysis had been solved. It is important to stress that all of them had been solved in advance in cooperation with the aluminum industry; there were no later modifications necessary.

Shop fabrication had to overcome two principal problems. First, welding techniques were needed that would avoid prolonged heat which not only changes the characteristics of the alloy but produces "bloom" in the anodizing process. Second, we needed an assembly and welding jig which would allow the weldor to reach all areas conveniently; such a fixture would have to maintain the screen without distortion.

Alcoa Research Laboratories helped in a solution to the first problem when they advised the use of a filler arc welding machine which introduces the weld metal through the nozzle of a welding gun. This technique, while performed at the same temperature as TIG welding, produces less heat and change in the base metal because it is faster and deposits less metal without excessive puddling.

This method also allowed the interior recesses of the egg-crate to be welded faster and more conveniently. The welds anodized a darker color than the base metal, but from a distance the welds are not distinguishable because of the dark charcoal gray color selected. This is a problem to be contended with in welding involving other colors.

The jig problem was solved by building a table with 32 perimeter clamps and mounting this table on trunnions so that it could be tilted to any desired angle between horizontal and vertical.

Sheared, Slotted . . .

The individual members were purchased sheared to size and slotted and notched with dies on a punch press. The egg-crate was then assembled, clamped in the jig and welded. The overlay members were pre-assembled, and then welded to the egg-crate outer surface as a final operation.

The next step in the fabrication process was the degreasing and cleaning, and then to the anodizing tank for a one-hour treatment. This produced an 8-mil coating. The color range was held to a 3-point variation, although a 7-point variation is considered acceptable.

Of interest is the fact that a recommended protective lacquer coating was omitted. Such a coating imparted a sheen which reflected sunlight.

Shipment of the units to the site was by Metal Trim trucks. This saved the cost of crating, a requirement of the public carriers.

There were 276 units which were installed at the rate of two (one full height panel) each 30 minutes. Final weight of each unit was 233 pounds. The crew consisted of four men—one on the electric hoist, one on the ground and two men positioning and bolting. The units were installed with practically no creep, although fabrication of the corner units had been held up as a precaution until completion, so that field dimensions could be taken and adjustment made.

The total wall has performed in excess of expectation since its occupation in November, 1959, and a fairly representative weather cycle of temperature range of 29° to 95° and a total rainfall of 73 inches, 10 inches above normal. There have been no leaks in the curtain wall, unusual for our high rainfall area. The advantage of this screen as an effective weather break is obvious.

Cost? Well Worth It!

In appraising the wall, we should give consideration to the cost of the screen. Without presuming the glass wall as a basic requirement, the economic justification of the solar screen is not possible. However, in comparing the present design to an all-glass building with drapes, the savings in air conditioning equipment is 45 tons, and more than twice that in air handling equipment.

Further, the control system serving the curtainwall of the building was considerably simplified in that no zoning was required for exterior walls. The air conditioning engineers were so impressed with the effectiveness of the screen (a full-size model was built) that sun load on the protected areas of glass was totally ignored.

The total of these savings was estimated at $65,200. Add to this the cost of drapes which the screen eliminated and the savings are increased to $79,700. Finally, the savings in operating cost and maintenance annually is $2200 which, over a 30-year projected life of the air conditioning system is $66,000.

The solar screen was approximately $160,000, which is about 9% more than the estimated saving. Considering the esthetic value of the screen, we feel it to have been economically justified.

In reviewing the design, the only modifications we would make in the light of experience would be to develop a splice detail having a better appearance; and to stiffen the overlay members. Because of the $\frac{1}{8}$-inch thickness of these members, they deformed when welded to the egg-crate. The warping is sufficiently pronounced to be observed, although it has not affected the sun control function.

In our judgment, we had extraordinary success in maintaining architectural intent during fabrication and erection. This is due primarily to early coordination with industry and the utilization of its knowledge and service.

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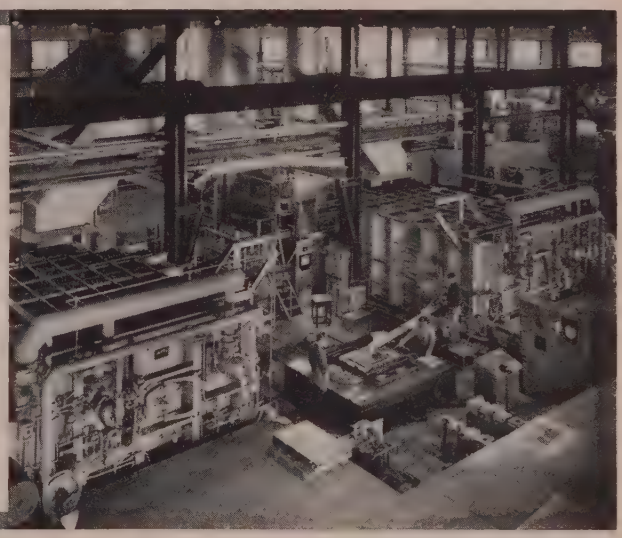

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Target: More Aluminum Exports

Industry advises government on what to bargain for at GATT meeting

UNITED STATES exports of aluminum have shown vigorous growth in the past few years and steps to insure further gains during the next 10 years, when world trade is expected to expand considerably, are being taken by the government.

The General Agreement on Tariffs and Trade (GATT) meeting, currently in progress in Geneva, is concerned with the problems this broadening market will present. The U. S. delegation is attending armed with comments from all industries on the specific export problems each encounters.

Before leaving for the meeting the U. S. delegation met with members of the aluminum industry to determine possible action by the government which would promote further growth of aluminum exports. The session also served to spotlight import problems. However, the industry and government officials were reminded that "we must buy if we want to sell."

The aluminum industry has already gained considerable export momentum on its own. Last year, 121,000 tons of primary metal were exported—an all time high accounting for 13% of total aluminum export business done by the free world, and doubling U. S. 1958 totals. And by the end of July '60, the record total was surpassed as 180,000 tons of primary aluminum had already been sent from our shores. The Commerce Department wants this to continue.

It is encouraging to note that we are setting export records while supplying industrially developed nations whose consumption last year averaged 7 pounds per person, as well as less developed nations who have averaged only 0.3 pounds per capita. Ours was 27 pounds.

Promote Uses Abroad

The most obvious course, according to these figures, would be to promote aluminum in foreign markets as vigorously as possible. But the problem is not one of merely getting manufacturers and masses to use aluminum — as was pointed out in the meeting.

Carl F. Oechsle, Assistant Secretary for Domestic Affairs, started the session by noting that the U. S. faces "severe competition" in foreign markets, as well as "serious barriers" including "licensing, quotas, taxes, specifications, standards, and outright discrimination."

George H. Becker, Jr., Deputy Assistant Secretary for International Affairs, explained that the GATT will be "particularly useful in attacking these import restrictions which other countries impose on U. S. goods." He felt that through continued work these restrictions will cease to dominate the trade picture.

A main portion of the meeting was devoted to reports and recommendations from the Aluminum Association (mostly concerned with mill products) and from the seven primary producers (concerned with crude metal).

Five Export Obstacles

The prepared statement of the Association detailed five obstacles to U. S. exports of mill products.

1. The developed aluminum markets of the free world are concentrated in 13 countries (not including the U.S.), and of these only six consumed more than 100,000 tons of aluminum last year. Any rapid increase in exports would mean penetrating these established markets.

2. These countries are exporters, too, because their fabrication facilities more than meet demand. Since the foreign market doesn't need our semi-fabricated products, we must compete with foreign firms for sales.

3. Competition is difficult because foreign prices are generally lower than ours. What's more, we must beat, not merely meet, these lower prices.

(The Association compared U. S. prices for six semi-fabricated products with the prices charged in 12 foreign nations. Of 65 foreign prices, 54 are lower than the U. S., and over half of these are 20% or more below our price tags.)

Price competition is difficult because "present profit margins in the U. S. aluminum industry are not sufficient to warrant vigorous price competition in foreign markets." U. S. price competition in foreign markets is further complicated because the exporter must bear tariff payments and the extra cost of overseas packing and freight.

4. The low foreign prices still offer the foreign fabricators a profit since their costs — especially labor — are lower. Also, foreign countries have tax benefits and other concessions granted by their countries to companies which compete with the U. S.

5. U. S. tariffs on semi-fabricated aluminum have been cut an average of 65% during GATT negotiations. But foreign tariffs, and other forms of discrimination, have increased. For example, Common Market countries once agreed to a 10% tariff, but now ask a gradual increase to 15% by 1970 or '73.

Import problems were brought up, too. Irving Lipkowitz, chairman of the Foreign Trade Committee of the Association, said that foreign fabricators, because of their lower production and labor costs, are able to undersell U. S. fabricators on their home grounds. For the first half of this year, imported mill products in the six top aluminum markets here represented 60% of all imports.

The Association recommended that during the GATT negotiations the U. S. seek to reduce foreign tariffs on semi-fabricated aluminum to the prevailing U. S. level. Also, that the export insurance program be altered so export shipments could be insured on a selective basis, rather than requiring a company to insure all exports.

The Association also suggested that GATT negotiations be broadened to cover more than governmental controls; and that it be recognized that some aluminum industries are government controlled, thus giving some foreign companies special financial incentives not available to U. S. industry. The Association also urged that a representative from the aluminum industry accompany and advise the U. S. GATT delegation in Geneva and counsel the Commerce Department's efforts to promote exports.

A final comment was that the most realistic approach to export and import problems "is increased consumption wherever it can be achieved," and that both problems be dealt with in relation to one another since "one country's export is necessarily another country's import."

Equalize Primary Tariffs

A spokesman for the primary producers asked that our delegation seek to reduce foreign tariffs on primary aluminum to the present U. S. level, which is equivalent to 4.8% ad valorem (according to the value of the product). He pointed out that the primary tariff is higher in 9 of 10 major aluminum consuming areas, than it is in the U. S.

The primary producers also urged the elimination of governmental barriers or limitations which discriminate against the entry of U. S. aluminum into their countries.

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Siding Industry Preparing Trade Practices Guide

Proposed rules will harness firms who exist on bait advertising, deceptive pricing, false product claims, fake testimonials, and other unethical and illegal operations. Federal Trade Commission and Aluminum Siding Association are working together on project.

THE FEDERAL Trade Commission has joined with the Aluminum Siding Association in an effort to make such words as honesty and integrity synonymous with the aluminum siding industry. This is no small task.

First step in helping this important aluminum industry to mature was taken by the ASA, which prepared a set of trade practice rules. Second step—discussion of these rules with the FTC—was taken September 9 in Chicago when 100 ASA members and others from the siding and related fields met with two FTC representatives.

Overseeing the meeting was FTC Commissioner Robert T. Secrest. Barnett Watson, a lawyer from the Bureau of Consultation, conducted the meeting.

FTC's Function is . . .

The Federal Trade Commission says "it acts only in the public interest, against allegedly unfair methods of competition or unfair, deceptive or monopolistic practices in commerce." The Commission operates in two ways—one punitive, the other preventive.

The first method starts with a letter from an individual who feels he has been "burned." The FTC investigates. If sufficient evidence is found, and if the FTC has jurisdiction, the case is numbered, a complaint is sent to the accused, and finally a trial is held.

The second method of enforcement is to teach members the ground rules of their industry. Secrest says knowledge of the law serves two purposes. It prevents otherwise reputable businessmen from getting into trouble; and "also helps those who know the rules spot those who are not abiding by them."

For such education the FTC compiles and publishes guides detailing those laws which apply to a particular industry. It is in this area that the siding association is working. The end result will be an FTC guide for proper conduct in the aluminum siding industry.

At the meeting, 27 proposals were read. A 3-week period was then alloted, during which time comments, discussion or additional rulings for the FTC to examine could be submitted.

When the FTC completes its examination, a new draft of proposals will be prepared and mailed to siding industry members. This draft will then be discussed at a second public meeting, then finalized. This second meeting must be held in Washington within three months of the first, says the FTC.

Watson explained that the final manual will be set up according to the specifications of existing laws. The aluminum siding guide "will demand no more—or less—than the law requires." He also noted that though the ASA started the proceedings, the guide was to be for the industry in general, not just association members.

A. Alvis Layne, attorney for the ASA started by defining "industry products" and "industry members."

Briefly, industry products are aluminum residential siding made in panels or boards of various sizes and patterns and produced with or without insulating material. Aluminum siding is pre-painted to provide additional protection and desired colors.

Industry members are persons, firms, and organizations engaged in the manufacture or fabrication of and the wholesaling, or jobbing or distribution of aluminum siding.

Next, Layne read the 15 proposals of the ASA. They were designed to govern: Deception in general; deception in pricing; quality of product; nature of sales transaction; agency status and authority; identity of manufacturer or seller; testimonials and seals.

Other areas covered misrepresenting products as conforming to standards; guarantees and warranties; substitution of products; defamation of competitors or their products; unfair threats of infringement suits; inducing breach of contract; procurement of competitors' confidential information.

Prior to the meeting, Paul M. Cameron, Chief of the FTC's Division of Trade Practice Conferences, said "The initiation of trade practice conference proceedings for the siding industry indicates a desire on the part of leaders to effect and maintain voluntary compliance of present and future members of the industry with the regulatory statutes administered by the Commission."

Such a statement indicated that Cameron expected enthusiastic prepared comment on the proposals of the ASA—which were mailed to members prior to the meeting. But this was not the case.

After each ASA proposal was read, the meeting was opened to the assemblage for comment. Only after the reading of the second and third rules did anyone have anything to say. The last 12 rules were read in succession without any opinion being voiced from the floor.

The FTC representatives asked several questions of those assembled to clarify some points on the siding industry. Response was forthcoming only after Commissioner Secrest made a special appeal for those who knew the answers to speak up.

Earlier, after several rules had been read without comment, Secrest explained that he and Watson had two days alloted to the conference, and that no one should feel that the meeting had to be hurried. But no spectators became participants and the session, which started at 10 a.m. ended shortly after 2 p.m.

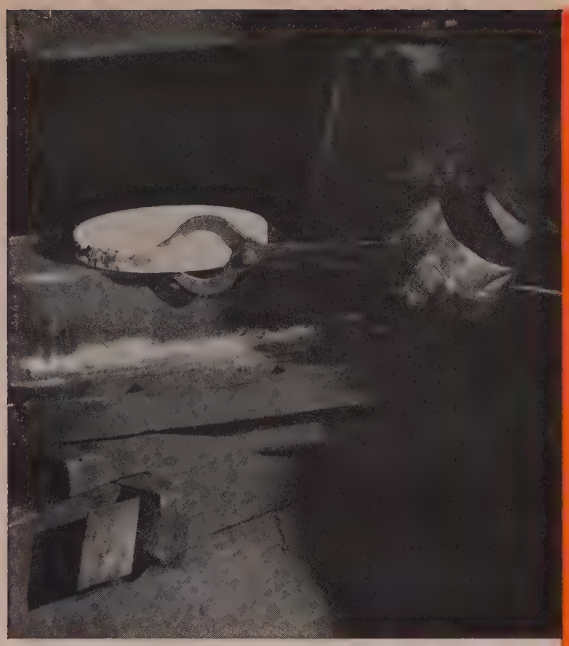
To be fair, those who were there should be congratulated for taking time from their businesses to attend. Also, they were inexperienced in such proceedings and, since most of them were ASA members, were probably willing to let the prepared proposals speak for them.

A Monumental Task

However, the task before the siding industry is not merely the preparation of a booklet but the installation of ethical business practices by the majority, not just a few. This is a monumental task and it deserves study.

But vigor and enthusiasm was supplied by Barnett Watson. He had numerous suggestions on how to fortify and amplify the proposals. He also had prepared 12 additional rules which he thought should be included in the guide.

Watson's proposals covered these areas: Deceptive use of the model home theme; false gift offers; bait advertising; misrepresentation of character of business; misuse of terms "custom-made," "custom-built," etc.; use of word "free"; enticing of employees, distributors, etc. of competitors; deceptive invoicing; exclusive dealing; prohibited forms of trade restraints; and prohibited discrimination of price, advertising, promotional allowances.



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Die Casters See Profitable Fourth Quarter

----but it's dependent on activity of auto and appliance industries, ADCI said at annual conference. Chances are good that aluminum requirements for balance of this year will average 16,250,000 pounds monthly to equal 1959 mark.

It isn't known to what extent the fortunes of the U. S. die casting industry parallel the general business trend, but most company executives who attended the annual meeting of the American Die Casting Institute in Chicago last month were pretty much in agreement about their business this year. Opinions ranged from "fair" to "very good." Some even went so far as to forecast a prosperous 1961.

By ADCI reckoning, the fourth quarter will be good enough to make up for spotty summer business and to carry total 1960 die casting production past the 1959 mark. None of the Institute's limited membership saw any reason to doubt this.

An ADCI statement said: "While 1960 die casting production to date is slightly below the volume indicated by high first quarter demand and rising requirements forecast by automotive, appliance and other fields, [we] estimate that 1960 total zinc die casting production may reach 335,000 tons, thus exceeding 1959 levels by 10,000 tons. Aluminum die casting is expected to top last year's figures by 12 million pounds and total 387,000,000 pounds."

Such production would mark a new high for aluminum die casting, the Institute said, explaining that its estimates are based on "substantial fourth quarter gains in passenger car and appliance production."

The Institute might be justified in anticipating a bountiful last quarter. American Motors Corp., Chrysler Corp., and General Motors have plans for die cast aluminum engine blocks in cars that are making their debut this model year. Report is that more die castings will be used in the 1961 lines than in previous years. Appliances are also expected to contribute to the increase.

Naturally, automobile sales volume will be an important factor in total die casting volume.

"If 6 million passenger cars are produced in 1961, zinc die casting consumption should approach the all-time high recorded in 1955 when 8 million cars, with fewer die cast components, were manufactured," ADCI said. "The increasing adoption by the automotive industry of aluminum die cast components for brake drums, wheels and engine blocks will also mean new highs for aluminum die casting production."

The Institute also noted that magnesium die castings are finding greater acceptance by auto makers, indicating that new high production levels could be expected.

But if most of the Institute's 121 member companies believe that 1960 will be some kind of a winner, they are less inclined to go along with optimistic views of 1961.

"The 1960 model hangover is big," one Detroit-oriented die caster said. "The need to sell the old models never helps new model sales. Besides, I'm concerned about next year, generally."

Another die caster expressed a complacent view of this year and next. Volume in the first three quarters had been favorable, though far from spectacular, and he estimated that the fourth quarter would be the same.

"I don't think there was a $2000 variation in sales from quarter to quarter," he added. "The way it looks now, the fourth quarter will be good, and '61 could be a continuation of this."

He is diversified in his operations, and spurns the auto business.

"They beat you down on the price and call you up at all hours of the day and night," he said of the Detroiters.

Fall's Not the Test

A president of a large die casting company in Ohio said that his firm was having a good year, "close to 1957" in sales. He rated 1955 as *the* boom year for die casters; 1957 next. About 75% of his firm's business is automotive.

"The last quarter should be good because of the new 1961 auto production," this executive said, "but January and February volume are always the real test for us. If auto sales are high in these months, we relax a little bit."

A few of the custom die casters thought they could see a recession in competition from captive plants.

"The captives lack the resilience and versatility of the job shops," was the explanation given by one die caster. "They get caught on retooling costs; find that changeovers aren't easy to accomplish economically as they figured. Result is, some parts seem to have found their way back to the job shops."

Another die caster had misgivings about 1961.

"If autos move the way everybody wants them to, we'll have a good year," he said. "Trouble is, I'm afraid auto sales won't be so hot in '61."

This man pointed to another threat more extended than Detroit's performance in '61. He produced a clipping from the *New York Times* advertising custom die castings from Japan. Another die caster who had just returned from Europe maintained that European shops were an even bigger threat.

"Consider a job that could cost $10,000 here," he said. "A manufacturer could turn around and send his blueprints to any of the European countries — except, say, Norway, Spain and Holland — and have a die made and the castings produced and shipped to the U. S. and still save $2- to $3000."

This die caster said he had lost some business to captive operations, but not enough to hurt him. As a rule, captive shops don't have the know-how to produce high quality work, he said.

David Laine, secretary of ADCI, reported on the International Die Casting Conference, held in Italy this past summer, and to which he had led an ADCI delegation. The 20 countries represented included the Iron Curtain states, Argentina, Japan, England, France, Italy and West Germany, which sent the largest delegation.

Alcoa's E. V. Blackmun reported on the papers presented at this conference, and F. C. Bennett, Dow Metal Products Co., reported on European plant visits made by a committee of 10 ADCI delegates.

Bennett, quoting from some of these reports, said that plants in northern Italy had good die shops. Production rates are not high by American standards, he said, and secondary operations

(*Continued on page* 45)

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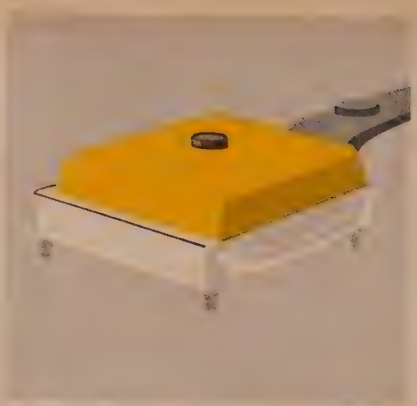

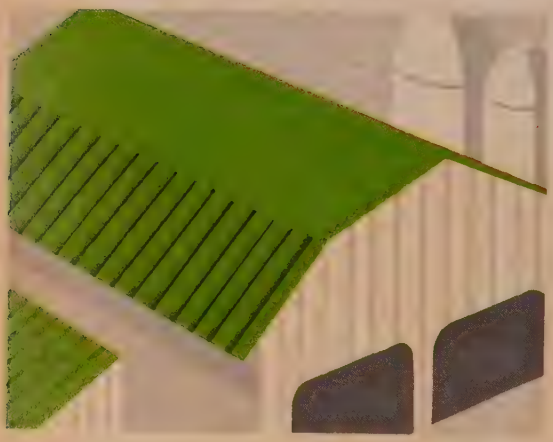

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are still largely manual. Bennett indicated that the Nelmor vacuum die casting system was in use in several plants in Italy, France and other European countries.

Bennett said there was a trend toward improved equipment and better die casting techniques in Europe and Japan.

Only one instance of anodized die castings was seen by the delegation. Bennett quoted the reporter as saying that they were "good looking castings, but not cheap to produce."

Dr. S. F. Radtke, American Zinc Institute, reported on the AZI Alloy Research program. Maurice R. Caldwell, Doehler-Jarvis Div., National Lead Co., discussed improved plating methods for zinc base die castings.

Short reports by members of the ADCI marketing committee brought the meeting to a close.

Give Nothing Away

W. N. Brammer, Precision Castings Co., cited a need for the die caster to improve his operations in the area of unscheduled changes — "the things that come up after the die caster has the job." Brammer exhibited what he called an external data sheet, designed to "prevent the die caster from giving away free operations and to enable the shop to do a better estimating job for the customer.

H. W. Bollman discussed die caster-customer relations in the area of disposition of dies and quoting on jobs that are already in production elsewhere.

S. A. Gullo, Chicago White Metal Casting, Inc., urged his listeners to promote the advantages of the ADCI membership and to use the Certified Zinc Alloy plan. He showed examples of advertising of various die casters who tied in their service with

Gordon C. Curry, vice president, Dollin Corp., Irvington, N. J., was re-elected president of the Institute. Walter E. Brown, executive vice president, Kiowa Corp., Marshalltown, Iowa, was re-elected vice president of the association.

The 1960 Doehler Award went to E. V. Blackmun, assistant chief metallurgist, Aluminum Co. of America, Edgewater, N. J., for outstanding contributions to the advancement of the die casting art.

The memory of the late Austin T. Lillegren, has been perpetuated by an award in his name. Lillegren was a past president and director of the Institute and vice president of Madison-Kipp Corp., Madison, Wis. First winners of this award were A. W. Simpson, III, president, Western Die Casting Co., Emeryville, Calif., and G. F. Hodgson, Doehler-Jarvis Division, National Lead Co., Toledo, Ohio. The awards are for service to the Institute.

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Stanat gang slitters are available in a complete range of sizes and capacities. Find out more about these economical slitters today. Write for Bulletin #569.

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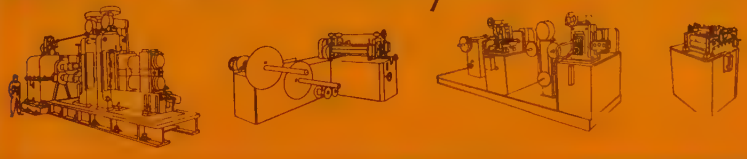


MFR'S OF ROLLING MILLS, GANG SLITTERS, WIRE FLATTENING MILLS, ROLLER LEVELERS AND BULL BLOCKS

Tough coatings and new equipment broaden markets for... Pre-Painted Aluminum Sheet

Modern, high speed roll-coating lines can process coiled stock up to 5 feet wide. Coatings withstand drawing and other fabricating operations. Zegers, Inc. expects main growth in building, automotive, and appliance industries.

by K. B. Rhodie, Associate Editor

THE ability of new equipment to handle wide strip and the availability of coatings which can withstand the rigors of fabrication are boosting the use of pre-coated metal and greatly brightening its future.

Latest strip coating equipment can process metal up to 60 inches and wider (12 inches used to be tops). And new coatings can be applied to metal and go through drawing, punching, drilling, rolling, slitting and similar operations without being damaged. Some coated materials can even be spot-welded.

Two divisions of Midland-Ross Corp. have combined their talents and products to produce strip coating lines for applying "fabrication resistant" coatings to wide strip. The Waldron-Hartig Div'n, New Brunswick, N. J., supplies roll-coating and coil handling equipment, while J. O. Ross Engineering, New York, supplies equipment for preparing metal for coating and ovens for baking the applied finish.

One recent installation of Ross-Waldron is in the Peotone, Ill., plant of Zegers, Inc. This new facility is the strip coating operation of the Chicago weatherstripping manufacturer.

Three Types of Jobs

Zegers does three main jobs on its new line. It coats aluminum for use in its own weatherstripping production, and performs job coating on aluminum and steel.

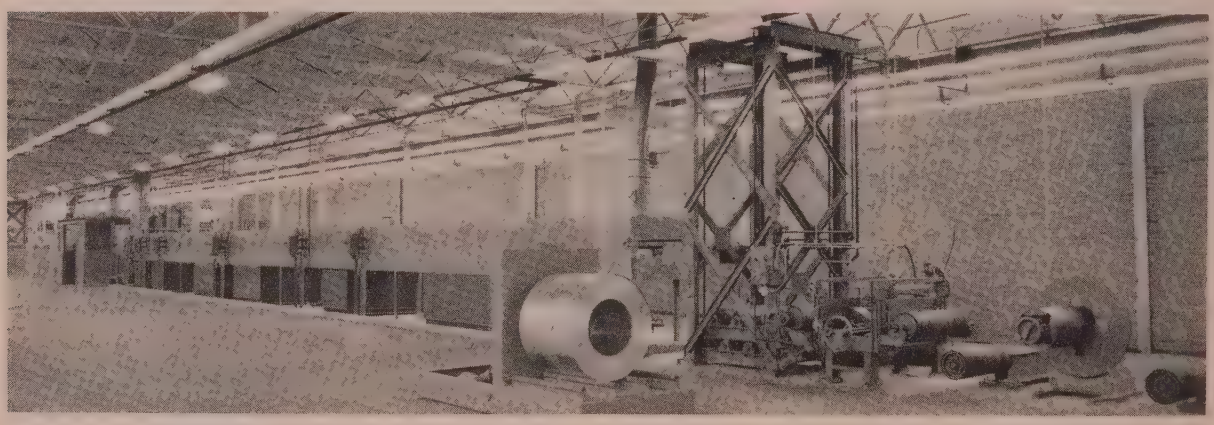
Strip to be used in the manufacture of weatherstripping is given a Zelite coating, the firm's own process which Peotone plant manager L. E. Sander calls "satin silver."

Zelite consists of the following: Normal coating operations but with a higher concentration caustic etch before the Bonderite step. This gives the metal a frosty appearance. The surface is then coated with a clear vinyl to stop oxidation.

For full understanding of a roll-coating line, let's follow a strip of aluminum as it wends its way around the rolls and through the ovens at Zegers.

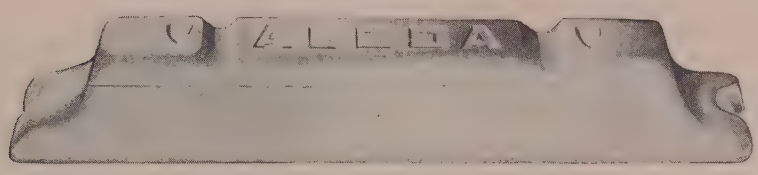
First, a coil of metal is placed on an uncoiler from which it passes into a feed roll stand and on to the rest of the line. The feed roll stand serves two purposes: It properly directs the metal to subsequent coating phases via its top roll, while the smaller and lower roll feeds metal during the splicing operation.

Next step for the aluminum strip is through the entry bridle. During normal operation this unit pulls metal from the coil, but during splicing, the entry

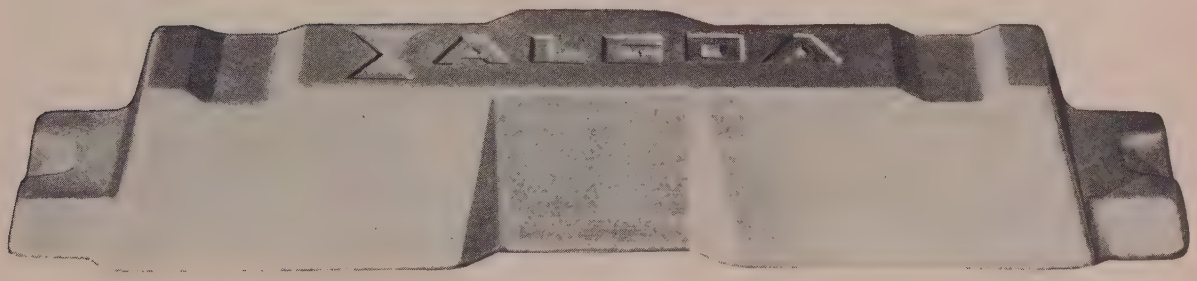


■ *This is part of the aluminum and steel strip coating line of Zegers Inc. In center foreground is coil of aluminum waiting to be placed on line. For coating, the coil will be placed on uncoiler at far right, will then pass on to feed roll stand, then to shear and splicing machine. After being joined to preceding coil, new strip will enter entry accumulator, lead in roll stand and then the metal cleaning and preparation sector of the line (most of left side of picture). Strip then passes through drying mechanism and drag bridle before entering coater (almost at edge of picture). After coating, metal goes on to other units not shown—oven, water rinse, squeeze rolls, drive bridle, exit accumulator, exit drive unit, shear and recoiler.*

this little pig won't go to market...



but this new ingot will!



Alcoa Aluminum Ingot replaces pig and is now sold at pig prices!

Remember: the Alcoa "pig" is now an ingot—available in 700-, 50-, 30-, 10- and 6-lb sizes!

Primary aluminum products—once known as "pig"—will now be produced by Alcoa by methods formerly reserved for the production of aluminum ingot. Final step in a multimillion-dollar program recently completed by Alcoa to upgrade its basic metal, this will eliminate many of the problems encountered in casting and extruding.

Improved appearance, greater internal cleanliness and more uniform composition—all significant features—are *now available at the pig price level.* Foundries will be able to minimize costly fluxing and holding . . . cut down on rejects.

Remember the six bench marks of quality you get *only* from Alcoa with Alcoa® Aluminum Ingot: refined, clean, pure . . . sound, uniform, customized. With scientific ingenuity and research dollars, Alcoa applies realistic control of quality to reduce the costs of *your* finished products. For more information, call your nearest Alcoa sales office, or write: Aluminum Company of America, 2119-K Alcoa Building, Pittsburgh 19, Pa.

ALCOA ALUMINUM

ALUMINUM COMPANY OF AMERICA

bridle holds fast the trailing edge of the spent coil while it is joined to a fresh coil using a metal stitching machine.

Another unit primarily needed for splicing is next in line. This is an accumulator tower which provides a backlog of strip so the line can operate without shutdown while a new coil is being spliced in place.

To build this backlog strip is led over an up-down trail of rolls. Fixed rolls are placed at the bottom of the tower, while the top rolls "float." During splicing the top rolls move down toward the fixed rolls freeing stored metal to be fed to the line.

When splicing is completed the entry bridle speeds up so the accumulator can rebuild its backlog. When the floating rolls have regained their position at the top of the tower, the entry bridle resumes normal speed.

Strip leaving the accumulator passes through a lead-in roll stand. This unit sets the height of the web for its coming trip through the completely enclosed metal cleaning and preparation section of the line.

The Zegers line consists of the normal five steps: Metal is cleaned for 20 to 30 seconds at 160°F; rinsed in luke warm water for 5 to 10 seconds; treated with Parker Rust Proof Co.'s Bonderite 721 for 15 to 20 seconds at 110°F; rinsed with cold water for 5 to 10 seconds; acid rinsed for 5 to 10 seconds at 140°F.

For Steel . . .

(If steel is to be coated, all preparatory steps are the same as described for aluminum except for the third when Bonderite 900 is used at 160°F.)

Gas-fired, steam-heated plate coils are used in the cleaning tunnel to bring the solutions to their proper temperature. After heating, solutions are pumped from tanks through several pipes and nozzles and uniformly sprayed on both sides of the moving web.

Pressure in these pipes is controlled through separate valving, bleed off connections allow sludge removal, and nozzles can be easily cleaned while the unit is operating.

Rubber-covered squeeze-off rolls are located at the end of each of the preparation stages. These prevent carry over of a solution from one section to another. At the end of the cleaning line is another set of squeeze rolls fitted with a sensing device which, along with another unit, checks and alters strip alignment as it leaves the tunnel.

After cleaning, strip is dried and passed through a tension bridle which, along with other drive units, applies proper tension to the metal for the next stage of the line — the coating.

On to the Coater . . .

After winding through the tension bridle the strip crosses an open space to the coater. Here the web snakes its way under the operator's platform, around a huge roller at the lower portion of the unit and up and around a smaller roller at the top of the unit.

It is as the web crawls over the top roller that applicator heads, rotating opposite to direction of strip travel, apply the coating. At this point, the coating is applied to one side of the strip, with the other side covered as the strip leaves the coater.

The applicator heads consist of two rolls. Chrome-plated steel metering rolls spin through a pan of coating material picking up regulated amounts, transfer it to smaller-diameter rolls which in turn spread the liquid on the moving strip.

All rolls in the coating heads are driven individually. This allows the precise speeds needed for various coating materials to be selected from a wide range of settings.

Coated strip then travels from the coater to the baking ovens traversing a short ventilated distance which is held at room temperature. During this short trip, some solvent flash-off takes place.

Then to the Oven

Strip is then baked in a gas-fired, two-zone oven. Plant-manager Sander explains that the two zones gradually bring the strip to that temperature where solvent flash-off takes place smoothly and produces the sleekest possible finish. He says that if the newly coated strip entered an oven already at peak temperature, "the heat would hit the strip in such a way that solvent flash-off would be almost instantaneous, causing craters and other blemishes."

Temperatures of the oven's two zones vary with the type of metal used, alloy, gauge and coating applied. Maximum temperature of oven is 650°F.

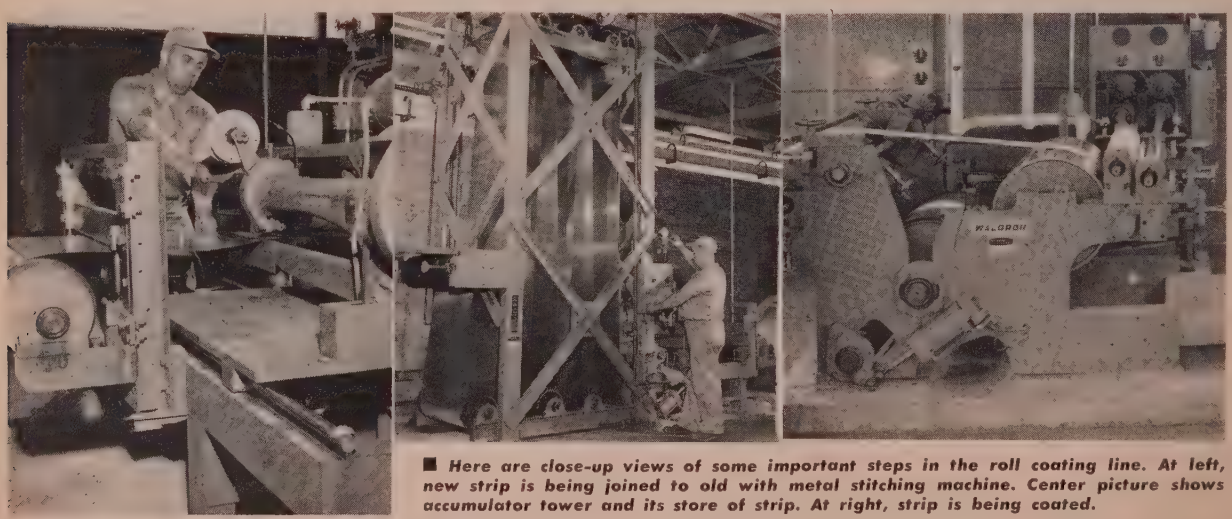
After baking the strip is quenched with luke warm water and dried by passing through squeeze rolls.

Cooled strip then goes through the exit accumulator and exit drive bridle. These two end units provide a backlog of metal so the splice can be cut out of the web, and the strip readied for recoiling.

Accumulator rolls are covered with neoprene and mounted on anti-friction bearings to protect the strip's finish. The exit bridle is used to apply proper tension and guidance for precise strip recoiling.

The completely coated and recoiled strip still has other operations to be performed on it. After quenching and recoiling, the coil is slit — on Yoder Co. equipment — to customer specification.

Then each coated coil is given at least five tests to be sure that the metal and its new exterior will perform as expected during end product manufacture. Tests include pencil hardness, solubil-



■ *Here are close-up views of some important steps in the roll coating line. At left, new strip is being joined to old with metal stitching machine. Center picture shows accumulator tower and its store of strip. At right, strip is being coated.*

SUPERIOR CASTINGS, EXTRUSIONS, TRACED TO USE OF ACHESON COLLOIDAL GRAPHITE

The excellent lubricating properties of these materials have been proven under the severe conditions attendant to aluminum permanent molding and extruding. In the specific examples described below, smoother surface finishes, longer die life, and more uniform metal flow are chiefly attributed to the application of a 'dag' brand dispersion.

Fewer rejects, consistently higher quality castings are obtained at Paragon Aluminum Corporation by spraying 'Prodag' on their permanent molds as a pre-pour wash.

Better surface finish with Prodag®permanent mold coating is just one of the reasons why Paragon Aluminum Corporation, a Division of Detroit Harvester Company located at Monroe, Michigan, switched to this Acheson product. After four years of experimentation with other mold washes, Paragon chose 'Prodag' — Acheson semi-colloidal graphite in water — and has used it constantly the past seven years. The reasons for its choice are these: uniform consistency, excellent heat-transfer quality, and its hard, smooth, tenacious film which resists flaking and provides easier parting characteristics.

With about 95 per cent of its annual output of more than two million pounds of castings going to the automotive industry, Paragon must insist upon quality. 'Prodag' helps to maintain this standard. Parts for convertible automobile tops are precision-molded from both 355 and 319 aluminum alloy. Molds are pre-heated before each day's run to 600° F. and the casting cycle maintains this temperature. The 'Prodag' dilution ratio is 1 to 4 parts water and is applied to the molds with a commercial spray gun. Aside from occasional touchup at points of greatest wear, this coating lasts through the entire run. Because of the physical contours involved in these comparatively small, light castings, they require rapid cooling in certain areas to insure uniform strength. The 'Prodag' coating — with its proven fast heat transfer ability — allows the castings to cool without breaks or pinholes. And by parting more easily, the high-finish castings which result have given Paragon Aluminum products wide acceptance in this demanding industry. If you have a metal casting problem, write direct for additional information contained in our Bulletin No. 425. Address Dept. MM-10.

'dag', 'Aquadag', and 'Prodag' are trademarks registered in the U.S. Patent Office by Acheson Industries, Inc.

FASTER APPLICATION, LESS MATERIAL USED IN THIS EXTRUSION APPLICATION

Aluminum Extrusions, Incorporated, of Charlotte, Michigan, has realized a 30% savings in their material handling costs by the use of Aquadag® — Acheson colloidal graphite in water. They formerly had used an oil-graphite mixture which required a dilution ratio of 16 lbs. of graphite to a 55 gallon drum of oil. It was too slowly applied by swab and too coarse to effectively apply by spray.

With 'Aquadag', Aluminum Extrusions has a lubricant that is finer in particle size, permits wider coverage, and provides greater "sprayability". These minute particles pass freely through the spray nozzle, eliminating the costly downtime formerly involved in cleaning clogged equipment. The tough, dry film 'Aquadag' forms upon the evaporation of its water carrier, doesn't smoke or react when applied to hot dies and metals. This improves working conditions as well as extends die life. Important also to both die surfaces as well as the finished extrusion, is the fact that this durable, low-friction film allows easier, more uniform metal flow.

Acheson 'Aquadag', applied on die surfaces provides faster, more uniform application for Aluminum Extrusions, Incorporated.

If your problem is more effective lubrication under normally adverse conditions of extreme temperature, pressures, or abrasions, call in Acheson. In the meantime, write for your free copy of Bulletin No. 426.

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ACHESON *Colloids Company* **PORT HURON, MICHIGAN**

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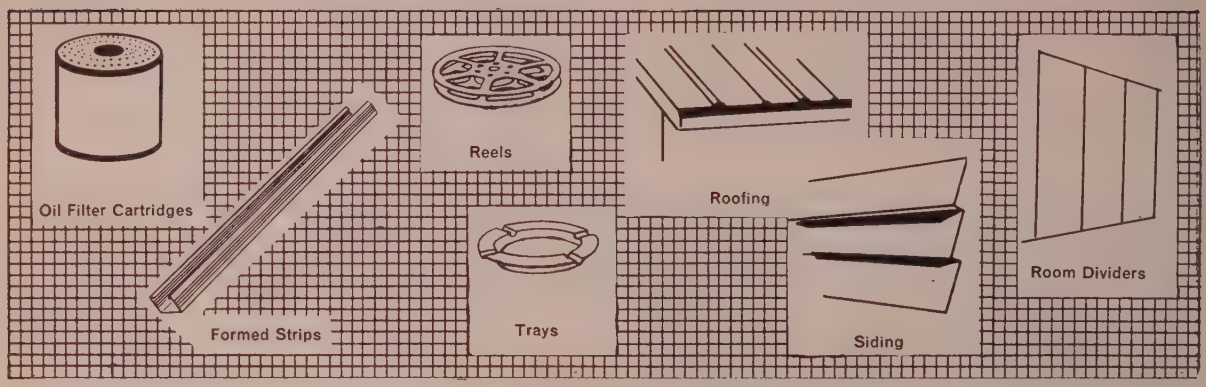
Products Made of Pre-Coated Strip



ity, bending, scratch and ball. If extreme manufacturing operations are necessary — such as deep draws — other tests are performed.

30-inch Strip—Tops

Zegers' line can handle aluminum or steel from 6 to 30 inches wide and thicknesses ranging from 0.006 to 0.032 inch. Coils can weigh up to 4000 pounds and can have an outside diameter of 48 inches. Any coating — vinyl, epoxy, butyrate, plastisol, alkyd, methacrylate, etc., in almost any color — can be applied by Zegers.

Right now, pre-coated aluminum strip is being widely used in many fields — furniture, building, automotive, appliance — with Sander predicting the greatest increases coming in the latter two areas.

In the automotive industry he foresees pre-coated aluminum being used in auto interiors first — for dash boards, door paneling, etc. — and eventually for exterior decorative material.

Current autos use pre-coated metal for coil condenser caps, oil filter cartridges, backing plates on dash boards, and also for some interior trim and side panels.

In appliance manufacture, Sander feels that porcelainizing will gradually give way to pre-coated aluminum. He claims as attractive a finish is produced but one that is also stronger and chip and scratch resistant.

Wide Strip in Demand

But in addition to large increases in these areas, there will also be substantial gains in others, claims Sander. These will mainly result from pre-coated wide strip being put to many uses that narrower coated strip could not handle.

Fabricators are anxious to use pre-coated strip because it can cut production costs. It is obviously easier and quicker — and therefore less expensive — to coat a flat continuous rolling strip than single formed parts; the fabricator is completely free of the entire painting operation; handling is greatly reduced; large expenditure for labor and equipment are eliminated.

When asked what the limitations of the roll coating process are, and what problems are still encountered, Sander observed: "We can coat almost any aluminum alloy and steel with any roll coating material marketed. There are few limitations on the process. The limitations come from the end product which will be fabricated from the coated strip."

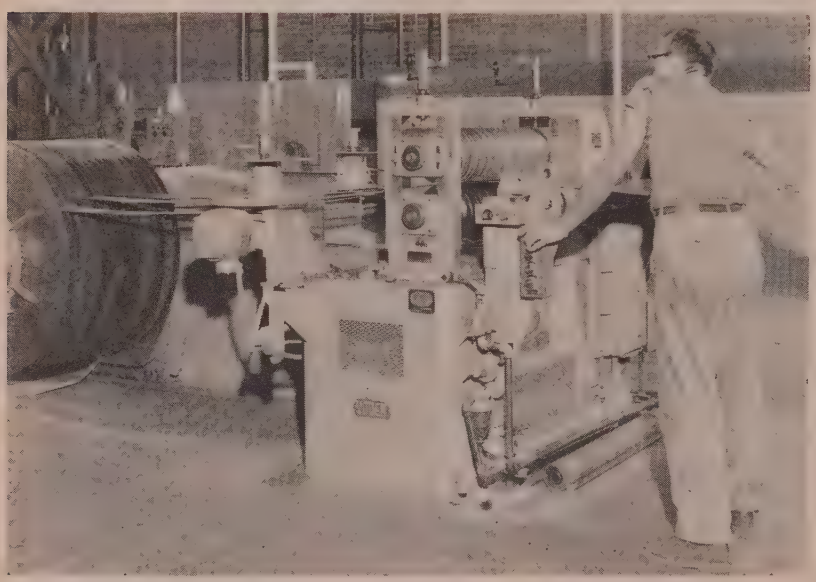
An example would be the specifications for coating metal to be used as residential siding. The choice of coating would be limited because of the weathering siding must withstand.

For instance, coatings used on siding must be sun-fast. Of course, all coatings and all colors do not offer this. Therefore, color must be selected from those offered in the sun-fast materials.

One Problem Exists

One current problem in roll-coating is painting textured materials. Processes now in use leave only a light film on high spots and a heavy deposit in the low areas. So far, the best solution seems to be to coat the metal with a highly elastic material and then emboss the sheet. This results in a uniform coating because the elasticity of the paint allows it to be formed with the metal.

But whatever the minor problems are that exist in strip-coating, future gains are imminent because of the increased area of application offered by pre-coated wide strip and new "fabrication resistant" coatings.



■ ***According to customer specification Zegers will coat any width strip from 6 to 30 inches. After coating, baking, drying and recoiling, Zegers will also slit strip to any other desired width. Here, a coil originally 30 inches wide is being cut to size on the Yoder Co. rotary slitter Zegers has in operation. Customer receives exact width coil with coating on one or both sides.***

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ROLLS

Aluminum can now be MIG Spot Welded

Metal-inert-gas spot welding has been successfully adapted to aluminum. Olin laboratories did the job; devised method of producing consistent cone-shaped welds. Equipment used for normal MIG welding can be inexpensively altered for spot process.

by I. A. MacArthur, Supervisor, Welding Department
and A. A. Dolomont, Welding Engineer
Metallurgical Laboratories, Olin Mathieson Chemical Corp.

METAL-inert-gas (MIG) spot welding was originally developed by welding equipment manufacturers for use on steel. It has not been widely used on aluminum because of difficulty in obtaining consistent results.

Now, however, MIG spot welding has been successfully adapted to aluminum as the result of process refinements developed by the Metallurgical Laboratories of Olin Mathieson Chemical Corp., at New Haven, Conn.

The process offers several advantages—including important savings in costs and production time—over conventional joining techniques. When joints have been properly designed the strength of MIG spot welds on aluminum is as high as, or higher than, that of rivets or resistance spot welds.

Appearance is improved, since the weld is made from one side of the joint only, leaving the other side smooth (see Fig. 1).

Since the process is a one-man operation, and punching or drilling of rivet holes is eliminated, MIG spot welds cost less than rivets. For example, in small boat manufacturing it costs approximately 5 cents to make a MIG spot weld. This includes welding materials, labor, overhead and depreciation of equipment. On the same basis, the cost per rivet is approximately 10 cents.

More Advantages

Other important advantages of the MIG spot process, particularly when compared to resistance spot welding, include the simplicity and mobility of equipment. It can be moved anywhere in the shop and is easily operated.

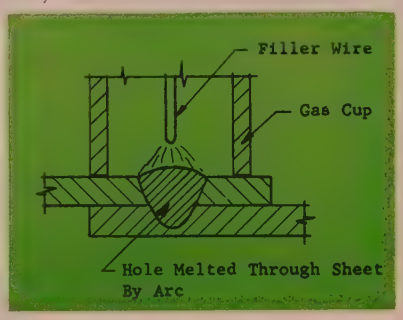
The combination of these advantages makes this process useful to a large number of manufacturers of aluminum products, including truck trailers, boats, houseboats, truck cabs, shipping containers, window and door frames, grating, electronic components, etc.

In spot, as with conventional MIG welding (see "Welding Aluminum, Metal-Inert-Gas Process," MM, July '60, p. 62), a direct current, reverse polarity arc is maintained between the end of the electrode and the work piece in an atmosphere of argon gas.

To make a spot weld, the operator adjusts the wire feed, arc voltage, etc., in relation to metal thickness and joint design. The nozzle of the gun is then brought to bear on the work with sufficient pressure to bring the two members into contact. The trigger is depressed and through a series of relays and timers, the arc is established and maintained long enough to fuse the two pieces. Weld time varies from one-half to one second, depending on metal thickness and type of joint.

Following are some advantages of the process:

1. High speed—one operator and machine can make 12 spots per minute.
2. No layout, drilling or punching of holes, as for riveting.
3. MIG spot welds are made from one side of the joint only.
4. No cleaning of base metal is necessary.



■ *FIG. 1. Drawing shows cone-shaped MIG spot weld, which is made from one side. Pressure is applied to top work piece with nozzle so that intimate contact is made between work pieces to prevent weld metal from spurting out between faying surfaces.*

5. MIG spot equipment is inexpensive and easily obtainable. A complete MIG unit costs about $3000.
6. Equipment is compact and mobile and is not limited by throat depth as is resistance welding.
7. Highly skilled operators are not required.
8. MIG spot welding does not distort base metal.
9. MIG spot welds are strong. Shear and bearing properties are as high as joints made with 5/32 inch diameter 2117-T6 rivets
10. Fatigue properties are higher than those of riveted or resistance spot welded joints
11. Corrosion resistance is equal to that of aluminum alloy joined.

MIG spot welding has certain limitations. It is not currently applicable to material lighter than 0.030-inch. If welds are to be made on material from 0.030-inch to 0.051-inch, a back-up plate should be used to control penetration.

For Unequal Thickness . . .

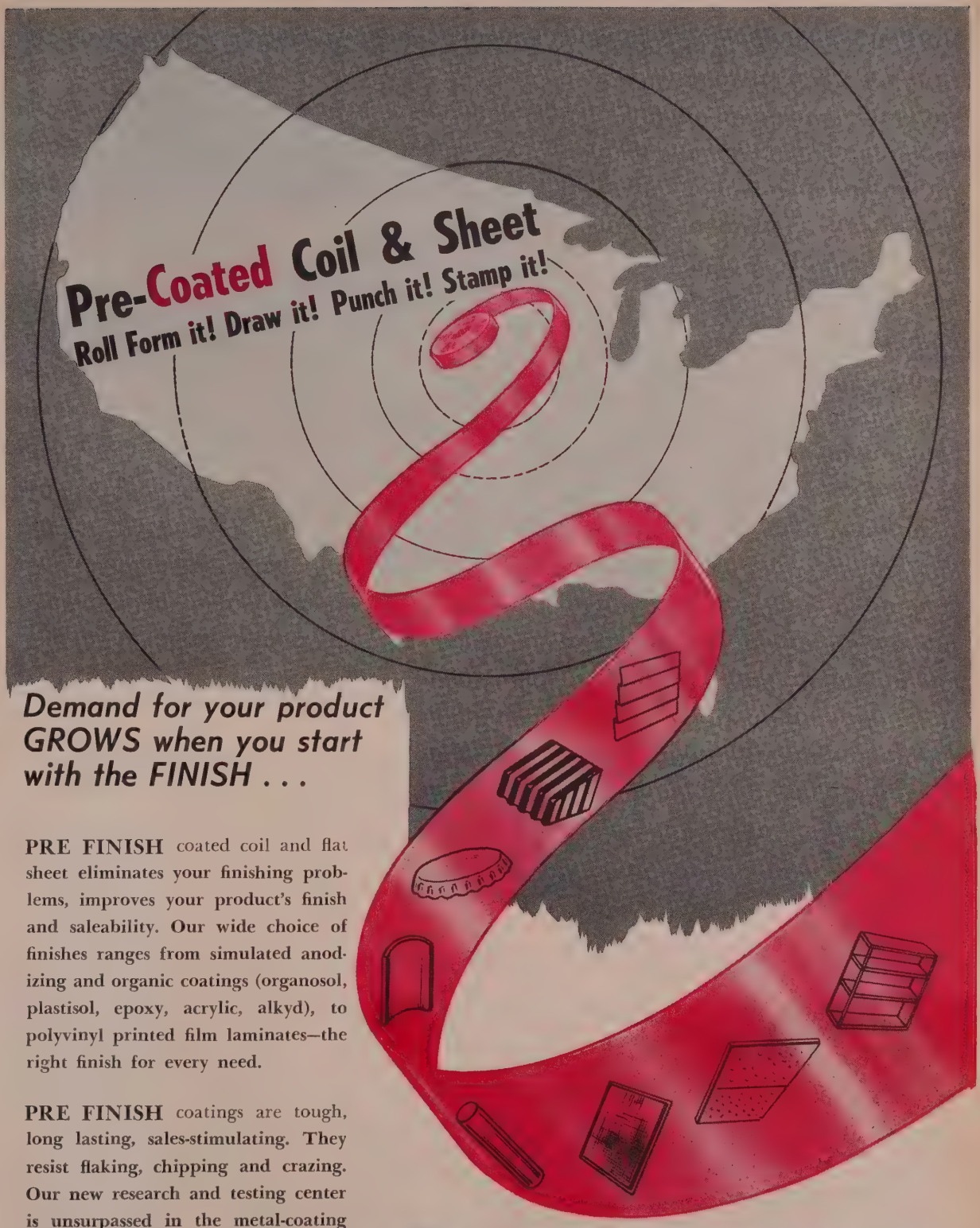
Also, it should not be used to join unequal thicknesses if the weld is to be made through the heavier member unless it is permissible to have complete penetration of the thinner sheet. The process cannot yet be recommended for joining high strength, heat treatable aluminum alloys, e.g. 2000 and 7000 series.

Inspection of MIG spot welds shows certain near-surface defects such as porosity and cracks. However, extensive testing of a large number of joints indictates that these defects are found only near the surface of the weld and not at the fused interface. Hence, they have no influence on shear properties.

It is anticipated that this process will find its greatest application in the fabrication of non-structural aluminum products currently being riveted.

For example, the process can be used

(Continued on page 56)



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9 GOOD QUESTIONS ABOUT MACHINING ALUMINUM ALLOY 2011-T3 "MICRO-CHIP"

Here are answers Kaiser Aluminum Distributors have given to specific questions about machining the new 2011-T3 Micro-Chip. If you don't see the answer to your question here, ask your Kaiser Aluminum Distributor.

Q. **What does the new product—2011-T3 Micro-Chip Rod & Bar—offer in machining ability and other benefits?**

A. 2011-T3 Micro-Chip is easier to machine, and in most instances gives smaller, finer chips. It can speed production and increase tool life. It has a brighter, cleaner finish on unmachined parts and provides consistently excellent machining characteristics.

Q. **What is the recommended form tool feed when using a ½" width form tool on ¾" diameter 2011-T3 Micro-Chip?**

A. The form tool feed for average screw machine works is .0025 to .003. The faster feed eliminates or minimizes the rubbing action between tool and work.

Q. **In order to control diameters when forming on automatic screw machines, what is the best top rake angle for form tools when using 2011-T3 Micro-Chip?**

A. The top rake angle for form tools when using 2011-T3 Micro-Chip is 0 to 3 degrees. More top rake angle on form tools does promote free cutting, but some difficulty may be encountered in controlling diameters, and tool wear is greater.

Q. **Can threads be rolled on 2011-T3 Micro-Chip used in screw machine work?**

A. Yes. 2011-T3 Micro-Chip can be thread rolled.

Q. **Are chip breakers ever used when machining 2011-T3 Micro-Chip?**

A. Very seldom, unless forming a wide width such as 3 inches or more with exceptionally slow feeds. Sometimes the chip removed is similar to a ribbon and could cause interference with other tools.

Q. **Can 2011-T3 Micro-Chip aluminum alloy be color anodized?**

A. Yes. Numerous companies are color anodizing 2011-T3 Micro-Chip with consistently excellent results.

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Q. **How does the electrical conductivity of 2011-T3 Micro-Chip compare with that of free machining brass rod?**

A. The electrical conductivity % IACS for 2011-T3 Micro-Chip aluminum is 40. For free machining brass, 25.5.

Q. **What difference, if any, is there between 2011-T3 Micro-Chip and free machining brass in tensile and yield strengths?**

A. Alloy 2011-T3 Micro-Chip has a tensile strength of 55,000 and a yield strength of 43,000. Free machining brass has a tensile strength of 58,000 and a yield strength of 42,000.

Q. **What are the recommended surface feet per minute speeds when machining 2011-T3 Micro-Chip as compared to 2017-T451 and 2024-T351 alloys?**

A.

Material	*SFPM Round*	*SFPM Hexagonal*	*SFPM Square*
2011-T3	700-1100	450-550	300-350
2017-T451	450-550	350-400	250-300
2024-T351	450-550	350-400	250-300

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Supplied as standard screw machine stock in specific 12-foot lengths, up to 3-inch diameter and 2-inch hex in standard 200-pound packages and specific 10-foot to 18-foot lengths for non-standard cold finished rod and bar and straightened wire with no length extra.

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to attach gunwales, seat brackets, spray rails, deck stiffening members and other components to the hulls of aluminum boats. Because of the resulting smooth surface on the exposed side of the hull, it may also be used to join longitudinal and transverse stiffeners to hulls, provided that good fit-up is maintained between the members being welded.

The fabrication of external top hat-framed truck trailers is a natural application for the MIG spot process. When the spot is made from the inside of the trailer through one or two thicknesses of 0.051-inch trailer sheet onto the 0.125-inch 6061-T6 extruded top hat, a smooth outside surface is produced.

Not For Smooth Skin

It is not expected, however, that MIG spot will be satisfactory for smooth skin trailers. With this design, the weld would have to be made from the outside through the light gauge sheet on to the internal frame. This would leave the weld nugget exposed. Since nugget shape is not as uniform as a rivet head, the appearance of a MIG spot welded smooth skin trailer would not be as good as a riveted one.

Aluminum truck trailer cabs are now being riveted. The MIG spot process is ideally suited to replace many of the riveting operations primarily because of saving in labor costs which it affords.

MIG spot welding can be used to join hollow window and door frame extrusions where a corner insert can be used. Here, the MIG spot weld is made through the extrusion onto the insert in a manner similar to that used with mechanical fasteners. However, since the hole drilling operation is eliminated and the weld made quickly, the MIG spot process could cut labor costs appreciably.

The process can make low cost, highly efficient joints in a variety of architectural applications, including building panels, lockers, furniture and louver assemblies. If the product is designed to conceal the side from which the spot is made, the exposed surface will have no indication of a weld. And if the proper filler is used, the joint will anodize without any color change.

Presently all aluminum grating is riveted or somehow mechanically fastened. But since these mechanical joints sometimes become loose in service, aluminum grating is being excluded from many applications. For safety, many codes specify a welded product—a perfect application for the MIG spot process.

■ ***Ribs of 14-foot aluminum boat are being spot-welded to hull via new MIG process. Extruded aluminum gunwale has already been spot welded to edge of hull. Equipment in background includes wire feed and power supply units.***

MIG spot welding will find its greatest application in products now being riveted. This means elimination of layout, drilling or punching and bolting operations, which will reduce labor requirements and cut overall fabrication costs.

Let's compare welding costs to those of riveting when fabricating an aluminum truck trailer eight feet wide, eight feet high and 40 feet long. The external 0.125-inch top hat extrusions are placed at 24-inch centers. Approximately 4000 rivets are required to attach the 0.062-inch or 0.051-inch trailer sheet to the top hat sections. For comparison, we will use the same number of spots.

(Data used in calculating riveting costs are based on practices used by one large manufacturer. In this case, 18 men are required to operate the line. If MIG spot welding were used, the same production could be achieved by six men because the punching operation and the task of manually inserting rivets would be eliminated.)

In arriving at a comparison cost between MIG spot welding and riveting, the investment in capital equipment has to be included. In truck trailer production, capital cost for MIG spot equipment (eight machines and a jig) is approximately $30,000, compared with an estimated $50,000 for a squeeze riveter.

The riveter would probably be written off over a four year period and the MIG spot over two or three years. However, as a conservative estimate, we are writing off the MIG spot equipment in the first year's production.

On this very conservative basis the calculated capital equipment cost for the MIG spot process is about $15.00 per trailer, vs. about $6.00 per trailer for riveting. However, the savings resulting from faster production and lower operating costs for MIG spot more than offset the capital cost differential.

Operating costs for riveting are estimated at about $236.00 per trailer, against about $100.00 per trailer for the MIG spot process. Thus, total operating and capital cost is $115.00 per trailer for the MIG spot and $242.00 for riveting.

Another cost comparison on a smaller, less automated operation is in the fabrication of the bottom of a 16-foot aluminum boat. The cost per spot weld or rivet is significantly higher than for automated trailer fabrication, but the ratio of costs of about 2 to 1 in favor of welding is still obtained.

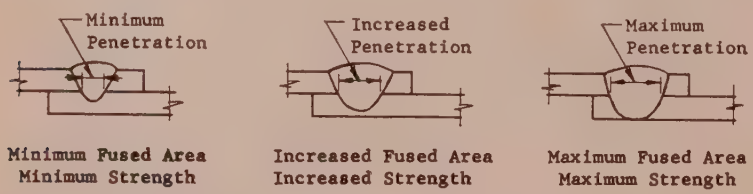
MIG Spots Cut Costs

Thus, it may be said that when MIG spot welding replaces riveting it should be possible to cut joining costs in half.

Equipment needed for MIG spot welding of aluminum consists of a direct current power supply with rising volt-amp characteristics, a wire drive mechanism fitted with the necessary controls, argon gas, coolant and filler wire. Since the process is used on steel and some other metals, these components are available from most manufacturers of MIG welding equipment.

Total cost of MIG spot welding equipment is approximately $3,000. MIG equipment can be converted for spot welding by adding a second control panel and a new gas cup at a cost of about $400. A rising characteristic power supply unit costs about $1200.

Any aluminum alloy that can be



■ ***FIG. 2. Drawings show which type of weld penetration offers minimum and maximum strength.***

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Table 1: Tensile Shear Properties of MIG and Resistance Spot Welds and Rivets

Aluminum Alloy	Thickness (inches)	Tensile Shear Properties of Joints: MIG Welds[1] (lbs./spot)	Resistance Welds[2] (lbs./spot)	Rivets[3] (lbs./rivet)
3003-H14	0.050	540	320	400
"	0.063	535	455	505
"	0.080	795	610	640
"	0.125	955	840	745
5052-H32	0.050	770	345	620
"	0.063	745	490	745
"	0.080	1180	685	745
"	0.125	1060	1300	745
6061-T6	0.050	685	345	745
"	0.063	695	490	745
"	0.080	1140	685	745
"	0.125	1080	1300	745

1. Average values for completely penetrated welds made with 5356 filler.
2. Design values for resistance spot welds as specified by Military Specification MIL-W-6858A.
3. Calculated design values for 3/16 inch diameter 2117-T4 rivets.

welded with conventional MIG equipment can be MIG spot welded, including the 1000, 3000, 5000 and 6000 series. At present data is insufficient to recommend the process for the 2000 and 7000 alloy series.

Metal ranging in thickness from 0.030 to 0.187-inch can be joined with the MIG process. Heavier material can also be MIG spot welded if the diameter of the filler is increased from 1/16 to 3/32 inch. With lighter gauges, particularly under 0.051-inch, it is recommended that a back-up be used to prevent burning through and undue scarring of the bottom member.

It is best to use 5356 filler on all aluminum alloys at all gauges because it is harder and more rigid than either the 1100 or 4043, and because its high strength in the as-cast condition provides welds with better mechanical properties.

Lap, tee, corner and butt joints can be MIG spot welded. Best results are obtained when specially designed gas cups are used.

Fit-up is an important factor in designing the joint. To get consistently high quality welds, the members being joined must be in intimate contact. If not, molten metal will be expelled from between the two work pieces or excessive penetration and burn-through will result.

Choice of welding procedures for MIG spot welding is usually the result of a compromise between weld strength and appearance. If high shear, impact and fatigue properties are required, maximum penetration into the bottom member is necessary. This will usually result in some scarring of the exposed member unless a back-up is used.

However, if appearance of the exposed member is most important, then the degree of penetration must be altered to minimize scarring or marking. This can be done, and total strength maintained, by increasing the number of spot welds.

The physical properties and consistency level of MIG spot welds are directly related to the cross sectional area of the weld at the joint interfaces. The cross sectional area, in turn, is related to the depth of weld penetration into the lower member.

Cone-Shaped Nugget

The weld is shaped like a cone whose apex occurs in the bottom sheet of the joint. As penetration increases in the lower sheet, the weld area at the interface increases with a corresponding increase in strength (see Fig. 2).

Samples containing two spots were tested to determine the tensile shear values of MIG spot welds in a number of alloys and thicknesses. Maximum penetrated joints were examined. The values obtained, based on an average of 20 samples, were then compared with the tensile shear properties of riveted and resistance spot welded joints (see Table 1).

Test data indicates that the tensile shear properties of adequately penetrated MIG spot welds are higher than those for resistance spot welds or for joints using 2117-T4 rivets. In cases where less penetration was obtained, the strength and consistency of MIG spot welds decreased (see Fig. 3). However, this does not occur when the weld is made through light gauge metal onto a heavier member.

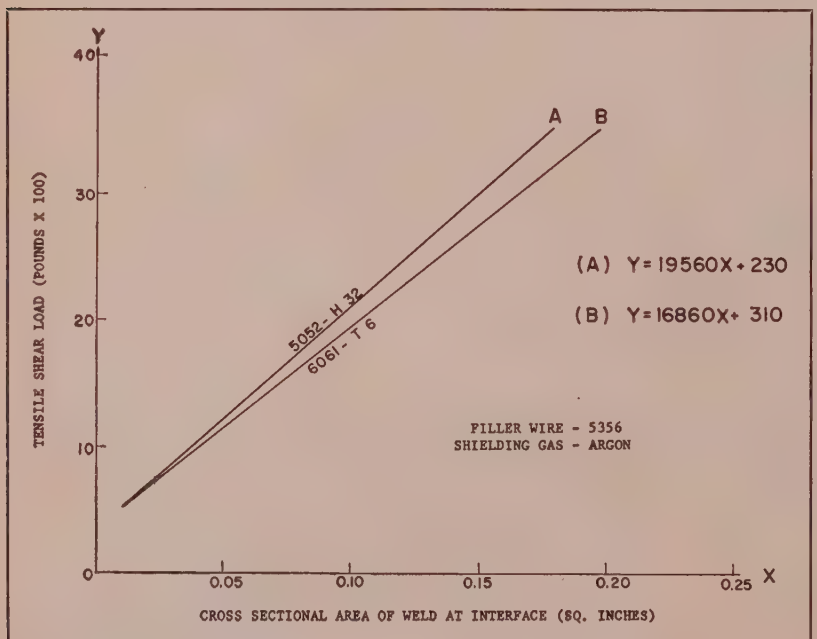
MIG spot welded samples were impact shear tested and the results compared with similar properties of calculated values for riveted joints using 2117-T4 rivets. (No data is available on impact shear values of resistance spot welds, but evidence indicates that the impact properties of resistance spot welds are considerably lower than those for riveted joints.)

High Impact Resistance

Study shows that the impact resistance of MIG spot welded joints is appreciably higher than that of riveted joints.

Other tests showed that fatigue values for MIG spot welds are above any reported for resistance spot welds, and comparable to those of riveted joints. Examination of broken MIG spot welded fatigue samples revealed that the failure started at the weld nugget and progressed to the outside edge of the test piece through the backing strip.

Only a very few samples failed in fatigue by shearing through the weld.



■ *FIG. 3. Graph shows how much tensile shear strength increases as penetration of cone-shaped spot weld increases.*

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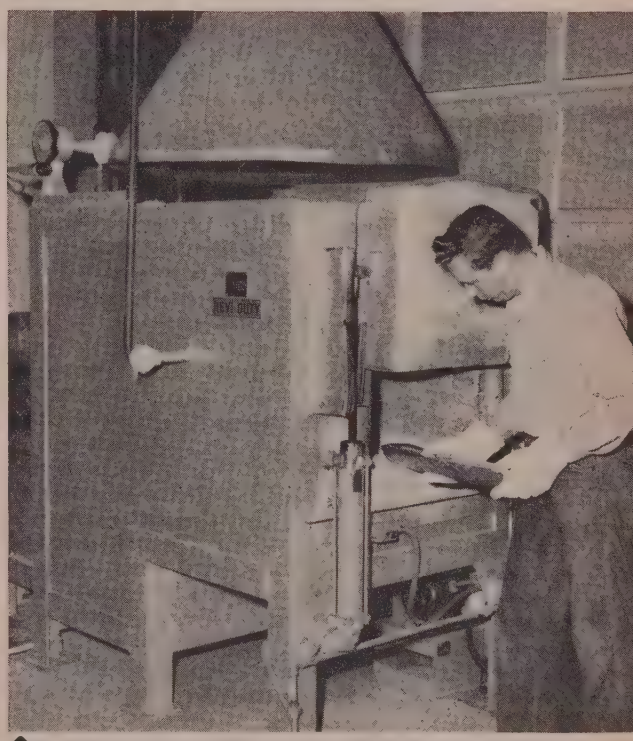
Wall Colmonoy Corp., Detroit, Michigan, uses this Hevi-Duty laboratory crucible furnace to find exact melting temperatures of hard-surfacing and brazing alloys. Furnace heats rapidly to the 2200° F. temperature required, provides precise control for melting and cooling tests on 250 g samples. User reports long element life at high temperatures. ***For more information, send for Bulletin 1246.***



This Hevi-Duty double-chamber, dry-hearth furnace melts 100 lb of aluminum per hour, 16 hours a day, 7 days a week at Alliance Mfg. Co., Alliance, Ohio. It can provide up to 200-lb-per-hour output and occupies little space. It maintains critical bath temperatures during charging. User states: "You can turn it on and forget about it." ***For complete information, send for Bulletin 593.***

Kawneer Company, St. Charles, Illinois, has installed a second pair of Hevi-Duty reverberatory furnaces for breakdown and holding in direct-chill ingot casting of four different alloys. Furnaces provide ± 10° F. control, pour at 1320° F., operate 24 hours a day. Capacity is 100,000 lb a day. Note in the foreground two of the 6,300-lb aluminum ingots produced. ***Please write for Bulletin 591.***

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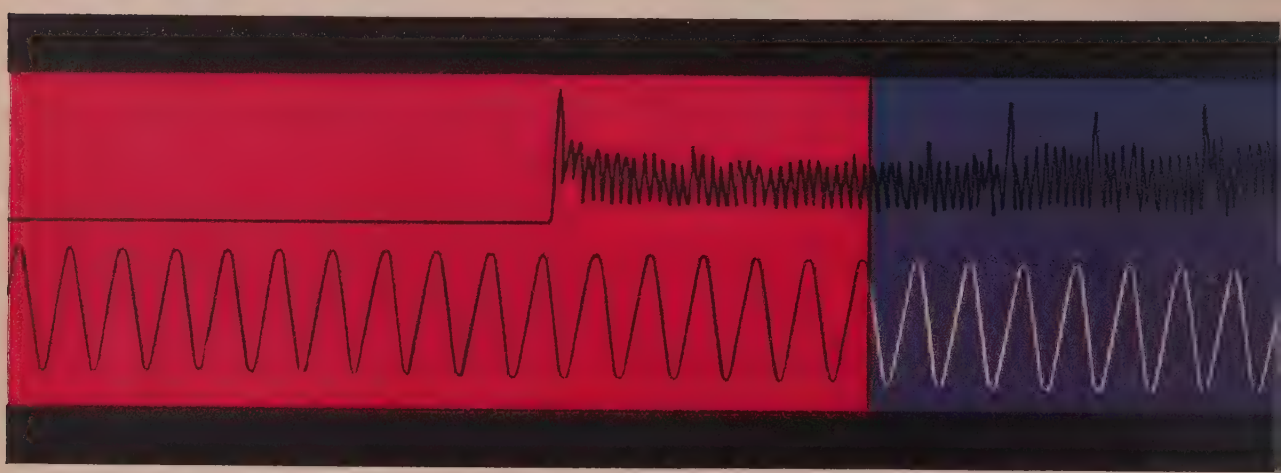

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Now, we have tests to prove its reproducibility. We can demonstrate that weldments made by this simple, speedy method are as good or better than rivets or resistance spot welds for most applications. In fact, technicians and metallurgists have referred to this process as "metallurgical riveting."

The MIG SPOT WELDING PROCESS overcomes previous difficulties associated with resistance spot welding such as the need for extreme cleanliness and very high capital equipment cost.

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The testing, proving and refining of the MIG Spot Welding Process typifies the kind of progressive thinking at Olin Aluminum. Modesty aside, we're quite proud of the men in our Metallurgical Research Laboratories.

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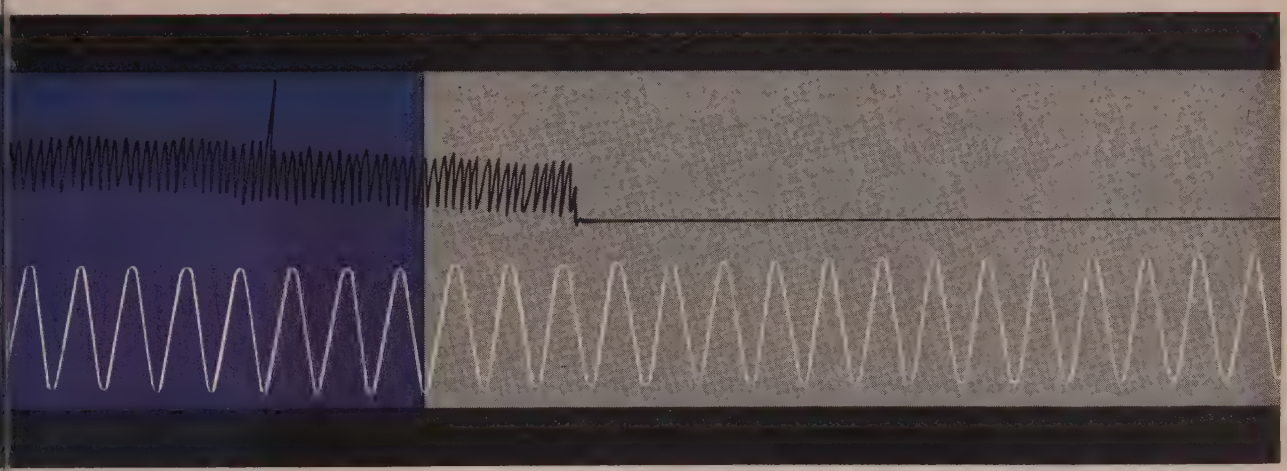

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■ ***Student designers who won Alcoa's 1960 Design Merit Awards Contest testify to the fresh, creative capabilities of the youngster in new product development. In picture at top, Androus Noyes demonstrates three sizes of his modular swimming pool; next, Dallas Molerin explains features of his "Minimum Living Shelter." Bottom photo pictures the Ribbon Chair, made of aluminum strip, with its designer, student Takatsu Sugiyama.***

LOOKING FOR NEW PRODUCTS?

Try Student Designers

SKEETER, a motorized aluminum scooter, will be in pilot production this year. Last year it was the dream of Lou Richards, a student designer who was doubtless equally preoccupied with thoughts of where his first job would be.

Skeeter won a design competition prize for young Richards and probably solved his employment problem—if he had one. The simple little vehicle (if one can flatter it with the term) doubtless solved another problem—that of the manufacturer who needed a new item to diversify his product line.

The new product quest is the constant concern of any company that wants to grow. But only the big, well-heeled manufacturer can take such a program in stride.

But for Small Firms . . .

The problem is slightly different for the small to medium sized company that cannot always afford to gamble on a product. For these companies a new product can become a catch-as-catch-can effort involving a raw idea conceived by someone in the organization and handed over to a high-priced design consulting firm for execution. The development cost alone can be prohibitive.

Budget limitations make new product development a "sometime" project in the smaller companies. But not even the giants expect a design consulting firm to come up with an absolutely original product idea; idea men are scarce in any company, regardless of size.

Lou Richards and his Skeeter—and the Aluminum Co. of America-sponsored Student Design Merit Awards which gave him recognition—suggest an avenue for new product development which the budget-wary manufacturer might profitably explore: The establishment of a program that would enable his company

Originating new products most often calls for expensive design talent, to say nothing of the demands such programs make on company executives' time. These factors tend to keep many small to medium-size companies "outside, looking in" in the new products quest. The Alcoa student design program suggests a solution to the problem, however.

■ *Marshal Corrazza (left) and Thomas Dulin demonstrate their unique life saving device.*

By H. K. Darby
Associate Editor

to tap the fresh, uncluttered minds of talented youngsters and give them the incentive to originate factory-producible items using aluminum.

The pattern laid down by Alcoa is simple; its aims are to foster a greater awareness of aluminum on the product design front and to give young designers some aluminum orientation.

The aluminum-using manufacturer could adopt this pattern, putting the emphasis on "products." He may or may not have student designers to interest in his program, but he could throw the competition open to as many vocational high schools as come within the local purview.

As Alcoa did, the manufacturer could donate aluminum to the various schools. The range of money prizes for models submitted could be scaled to the company's budget.

There is no reason to doubt that young shop students would rise to the challenge of such a program as enthusiastically as the design students responded to the Alcoa competition.

As was the case last year, the prize-winning projects in Alcoa's 1960 competition are notable for their variety, though four of them could be said to fall within the field of water sports.

Faculties Picked 'Em

The faculties of the various schools were the judges. At Syracuse University's Department of Industrial Design, the teachers selected the Ski Horse, a fresh concept in speed boating. According to S. Jack Magri, the student designer, it not only affords a new approach to the sport, but might also serve as a "base" for skin divers.

Budget conscious Americans might find considerable appeal in the modular swimming pool designed by Androus D. Noyes, a student at New York's Pratt Institute. It is assembled from two types of panel, a six-foot equilateral triangle and a 6 x 9-foot rectangle. Since it is used above ground, it may be disassembled and moved, and may be expanded by the addition of new panels when the family feels it is ready for a larger pool.

A unique folding aluminum boat called the Polliwog won the plaudits of the teachers at University of Illinois' Department of Art. According to its designer, John E. Thompson, the boat is intended for fishermen. Its folded compactness was conceived with small sports cars in mind.

The serious side of water sports was considered by students Marshall Corrazza and Thomas Dulin, both of the Industrial Design School of the Philadelphia Museum College of Art. These youngsters conceived a water rescue de-

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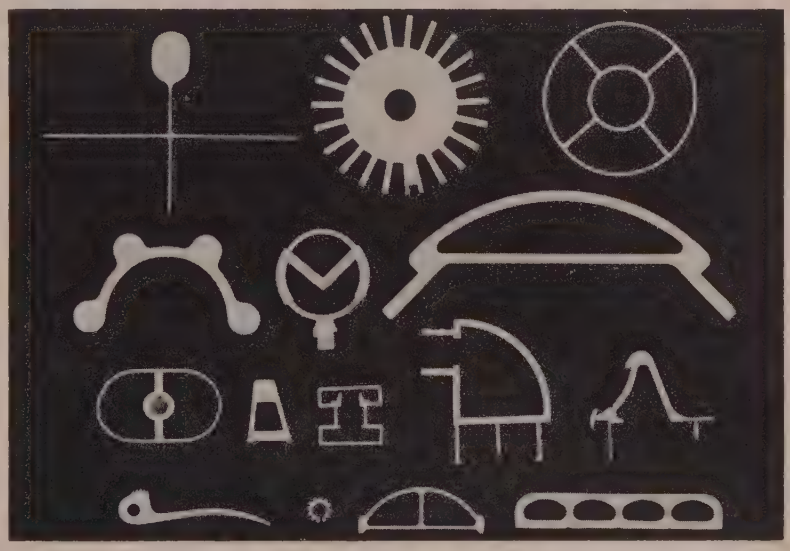

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Young John E. Thompson unfolds his collapsible boat, Polliwog. The small boat would serve solitude seekers, mainly—or the less energetic fishermen. Photo right: S. Jack Magri designed his Ski-Horse for water sports and skin diving. It's propelled by an outboard motor encased in the pod formed by its two aluminum skis (water-sealed with a gasket where top and bottom shell meet). Design schools of six of the nation's colleges and universities took part in Alcoa design competition.

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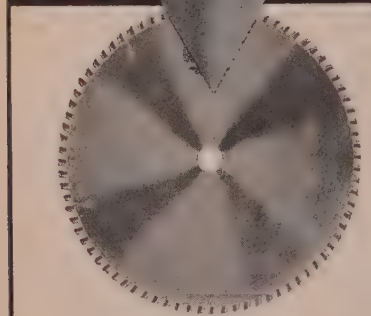

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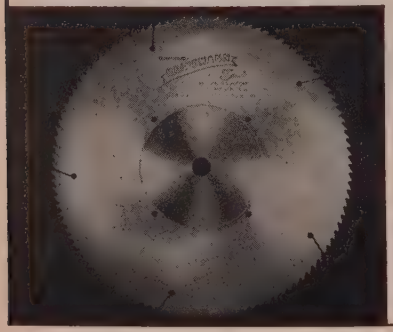

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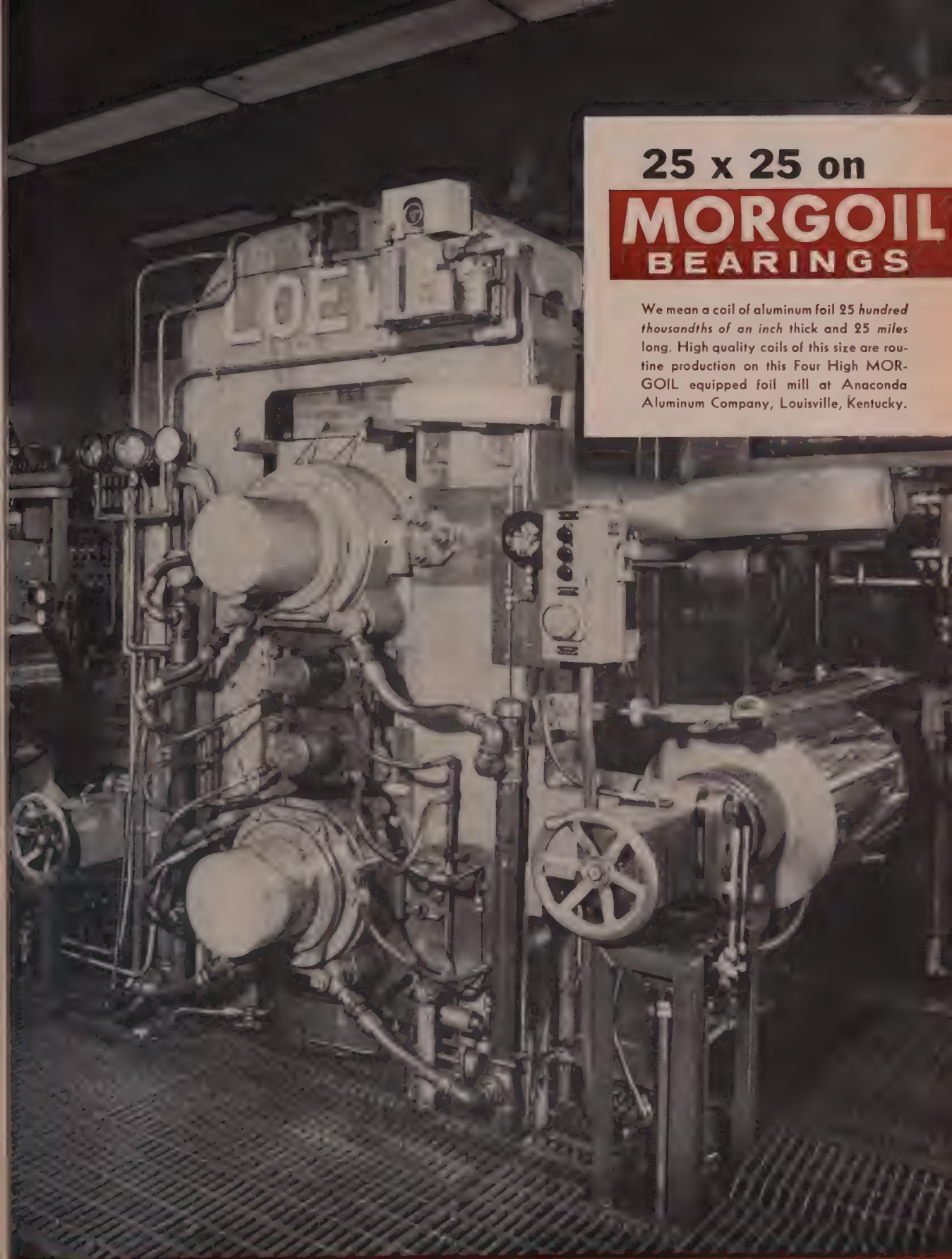

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Welding Aluminum

Part 6: Oxy-Gas and Metal Arc Welding

This article covers two welding methods—oxy-gas and manual metal arc. Discussion in both sections includes principles of operation, joint spacing, flame selection and technique. Next month, the various brazing procedures—torch, dip, furnace—will be detailed.

Based on information supplied by Aluminium Laboratories Limited, Research Division of Aluminium Limited

IN OXY-GAS welding heat is supplied by a flame obtained by the combustion of a gas, usually acetylene, with oxygen. An active flux is used and filler material, if required, is added separately. Oxyhydrogen can be used on thicknesses up to 0.064 inch, but other oxy-gas mixtures are used only for preheating.

Oxy-gas welding equipment is inexpensive, readily available and portable. An advantage of the process is that in some applications it may be economical for welding thin gauges of aluminum (0.032 to 0.064 inch). For the thicker gauges (over 0.125 inch) other processes are more economical.

Flux Can Be Harmful

The main disadvantage of the process is that the active flux leaves a residue which is a potential source of corrosion, especially between faying surfaces. Thus, it must be removed. Other disadvantages: A wide heat-affected zone is produced; welding costs are usually higher than for inert-gas-shielded arc welding (MIG or TIG); distortion is greater than in arc welding.

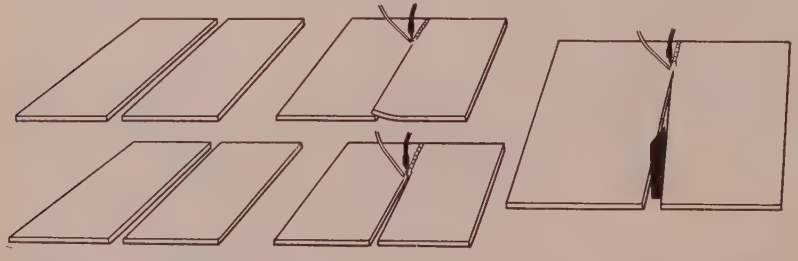
Alloys 1100 and 3003 are well suited for oxy-gas welding, but use of the process on 5052 and 6061 alloys results in considerably lower mechanical properties than those obtained by arc welding. Therefore, these alloys should not be oxy-gas welded if they are to be subjected to critical service conditions.

Equipment needed for oxyacetylene welding of aluminum and its alloys is the same as that used for gas welding other metals.

Oxygen and acetylene can be obtained in cylinders of various capacities, but in some plants it may be advantageous to pipe gas to the work area from a central supply station. Standard two-stage regulators and connecting hose are satisfactory.

Commercially available torches with a good range of tip sizes can be used. Because of the high speed of aluminum welding, lightweight torches are most easily manipulated. They will be found more serviceable if they produce a soft flame with a fairly wide range of adjustment with each tip size.

The function of the flux is to remove the oxide film from the aluminum but not dirt, oil or grease. Store flux in clean aluminum, glass or earthenware containers to prevent contamination. Never use steel containers.



■ ***Fig. 1. Sheet spacing for oxy-gas welding. Tapered space is used (above) instead of jig because of contraction on cooling which occurs behind weld as welding progresses. Taper usually varies from ⅛ to ⅜ inch per foot.***

The period between fluxing and welding should not exceed 45 minutes. A fresh flux mixture should be made up every four to eight hours. At one-half to one hour intervals the consistency should be adjusted.

The welding rod or wire should be bare, clean and in either straight lengths or coils. Filler materials recommended in "Part 2: TIG Welding" (MM, June '60, p. 50, Table 1) should be used if oxy-gas welding is applicable. (The Al-Mg alloys, except 5052, should not be gas welded. Further, when oxy-gas welding 6061, do not use the alternate Al-Mg fillers listed.)

The basic types of joints may be used in oxy-gas welding. However, tee, lap, and edge joints are not recommended unless they can be sealed by welding all around the faying surfaces. The recommended edge preparation for butt joints in various thicknesses of aluminum is given in Table 1.

Jigging is Important

Proper jigging and positioning of material is especially important in oxy-acetylene welding because a large amount of heat is applied over a large area of metal adjacent to the joint. In jigging, see to it that joint edges are aligned and spaced correctly.

Space width depends on the gauge and type of joint. Spacing (see Fig. 1) must be maintained by wedges or clamps until tacking and/or welding is completed. Joints may be hand positioned for tacking if no jigs are available and welding is not repetitive. Tacks should be close together and made progressively.

On long straight joints that are not jigged or tacked, tapered spacing may

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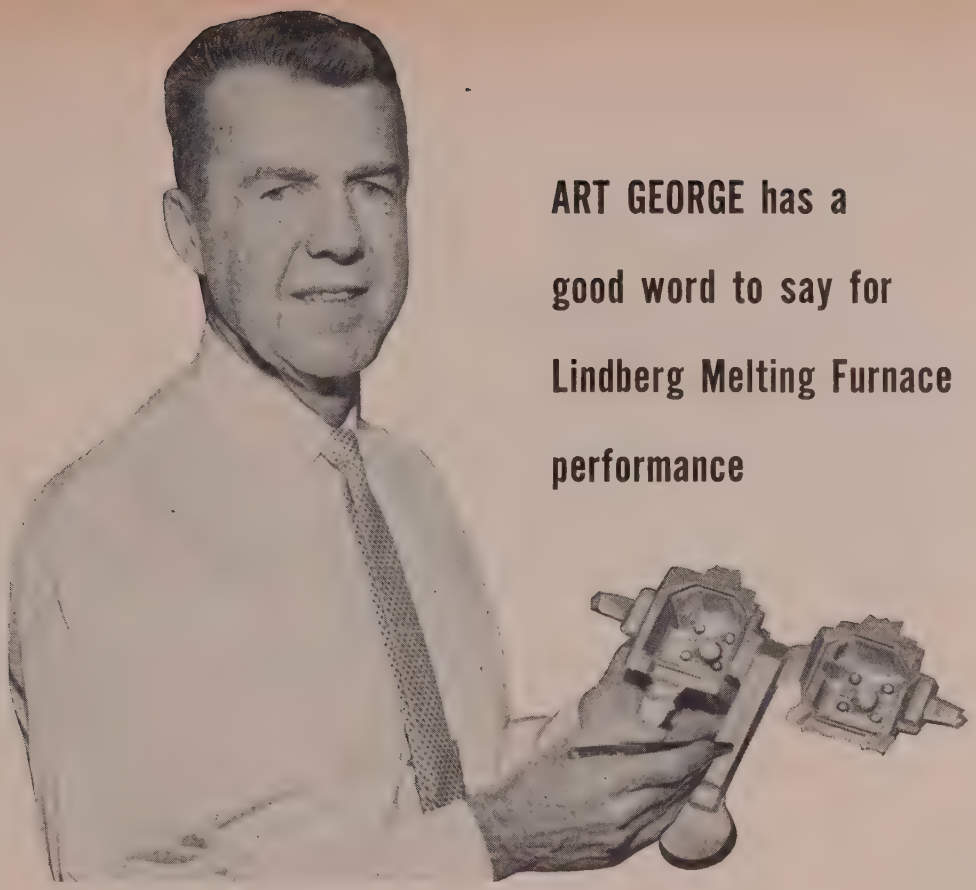

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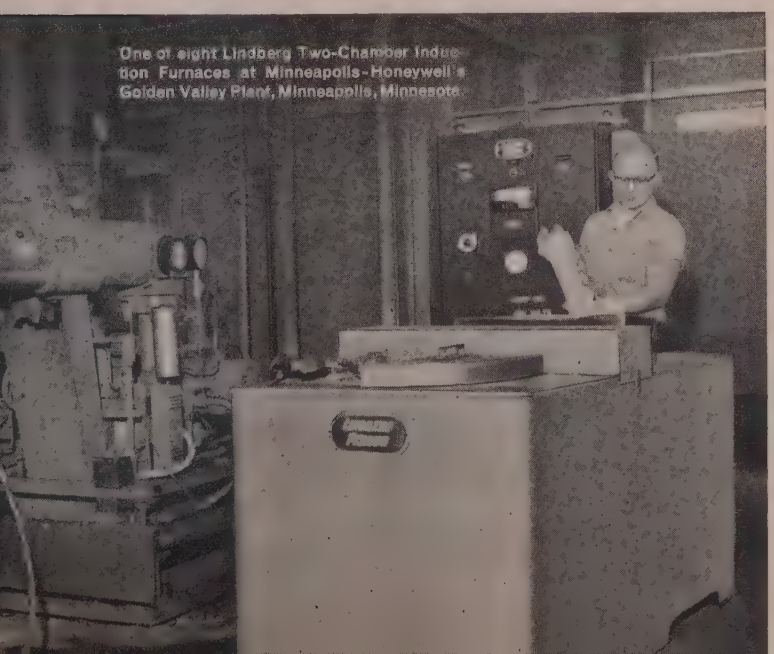

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be used. The joint will close as welding progresses due to contraction on cooling behind the weld. The amount of taper usually varies from ⅛ to ⅜ inch per foot.

Tack welds should be spaced about 1 to 2 inches apart on material up to 1/16 inch thick and up to 8 inches apart on ½ inch material, but will be dependent upon requirements for strength and alignment. While strong tacks are advisable they should use a minimum of filler to facilitate penetration and improve appearance after final welding.

Fluxing of the parent metal is not usually necessary on 1100 and 3003 alloys except when using flanged or 30° shear-type joints. With these joints, and when using all other alloys, the joints should be fluxed by brushing immediately before jigging. The surface of the welding rod or wire must also be completely covered with flux by brushing or dipping.

A slightly reducing welding flame will give the best speed and economy as well as a clean, sound weld. Even slight excess of oxygen will promote oxidation of the weldment while an excess of acetylene will not concentrate the heat sufficiently. The white part of the flame should never touch the work.

The very slightly reducing flame has a second, and larger, feathery-white cone extending approximately 1/16 inch beyond the inner cone of the neutral flame. For oxyhydrogen welding a slightly reducing flame is also recommended.

Tip size and gas pressures used vary with the thickness of material, type and location of the joint, as well as with the skill of the operator (see Table 2). When two-stage regulators are in good working order, the indicated low-gas pressures are preferable — but these must be increased with inaccurate regulators and the gas controlled at the torch valves.

Use a Soft Flame

A soft flame is necessary for best results, so use each welding tip only at the lower range of its capacity. A harsh, strong or noisy flame will cause turbulence, oxidation and defective welds.

Preheating is necessary when oxyacetylene welding aluminum over 0.064 inch thick.

To weld, hold the flame perpendicular to the work, about an inch or more from the starting point, and use a circular motion with ever increasing radius to preheat the adjacent metal. Keep the white cone of the flame at least ⅛ inch from the parts.

When both edges of the joint have been preheated uniformly, and become molten when the flame is concentrated momentarily on the starting point, filler material may be added. Hold a preheated welding rod just at or slightly below the surface of the molten metal.

After welding has started, the torch angle should be adjusted so the flame preheats the edges just ahead of the puddle. Speed should be as great as possible, consistent with good penetration, for the soundest weldments.

Flat, horizontal, vertical and overhead oxyacetylene welding of aluminum and its alloys is possible. When welding in the horizontal, vertical and overhead positions, use a slightly smaller tip size, and preheat from the side of the material opposite to that on which the weldor is working.

In all four positions the torch angle greatly influences welding speed. To avoid burning holes in the metal once the puddle is established, the torch should be held at a flat angle thus increasing the speed. And as the end of the joint is approached, make the torch angle progressively flatter so that at the end of the joint the flame is playing practically on the welding rod only. This applies particularly to welding thin gauge materials.

Where more than one pass is necessary, the recommended procedure is to complete the first pass then the second. However, occasionally a cascade-backstep sequence may be used. For this, the first pass is laid down for about 1½ inches, then the second layer is built up before the flux solidifies, and the cycle is repeated. Be careful not to entrap any flux in the weldment when laying down the second pass.

Welding in the flat position is always preferable and work should be positioned for this whenever possible. This will help overcome various welding difficulties and produce welds of the highest quality and appearance.

In the flat position (Fig. 2) point the flame away from the completed weld and so it heats both edges of the joint and the welding rod evenly. Keep the flame and welding rod in line with the joint. The angles between the work and the flame, and the work and the welding rod, should be 30° to 45°.

Start an inch or more from the right-hand, weld from right to left, then return and weld the unfinished portion of the joint in the opposite direction.

When welding material under 3/16-inch thick, the torch should be held at a lower angle (approximately 30° or

(*Continued on page 72*)

TABLE 1:

Recommended Butt-Joint Preparation For Oxy-Acetylene Welding

Thickness of material, inches	Joint Preparation	Joint[1] Spacing
FLAT WELDING		
up to 1/16	**Flange** or 30° shear	0
up to 1/8	**Plain butt**	1/2T
1/8 to 1/4	**Single Vee**-included angle 45-60°-nose 1/16 inch	1/2T
1/4 to 3/8	**Single Vee**-included angle 60-90°-nose 1/16 inch	1/2T
3/8 to 1/2	**Double Vee**-included angle 45-60°-nose 1/16 inch	1/3T
1/2 & above	**Double Vee**-included angle 60-90°-nose 1/16 inch	1/4T
VERTICAL WELDING		
up to 3/16	**Plain butt-welded** from one side	1/2T
up to 1/4	**Plain butt-welded** from both sides	1/2T
1/8 to 1/4	**Single Vee**-included angle 45-60°-nose 1/16 inch welded from one side	1/2T
1/4 to 5/16	**Single Vee**-included angle 45-60°-nose 1/16 inch welded from one side with second torch preheating reverse side	1/2T
1/4 to 1/2	**Single Vee**-included angle 60-90°-nose 1/16 inch welded from one side with second torch preheating reverse side	1/3T
1/4 to 1/2	**Double Vee**-included angle 45-60° nose 1/16 inch welded simultaneously from each side using two torches	1/3T
1/2 & above	**Double Vee**-included angle 60-90°-nose 1/16 inch welded simultaneously from each side using two torches	1/4T

NOTE: [1]Joint spacing is given as a function of the thickness "T".

TABLE 2:

Regulator Gas Pressures And Approximate Tip Diameters

Thickness of Material, Inches	Tip Orifice Diameter, Inches	OXYGEN AND ACETYLENE PRESSURES psi	Millimeters Mercury
0.025	0.025	1	52
0.036	0.035	1	52
0.056	0.055	2	104
0.092	0.065	3	156
0.156	0.075	4	218
0.25	0.085	5	260
0.31	0.085	5	260
0.38	0.095	6	311
0.50	0.105	6	311
0.63	0.105	7	363

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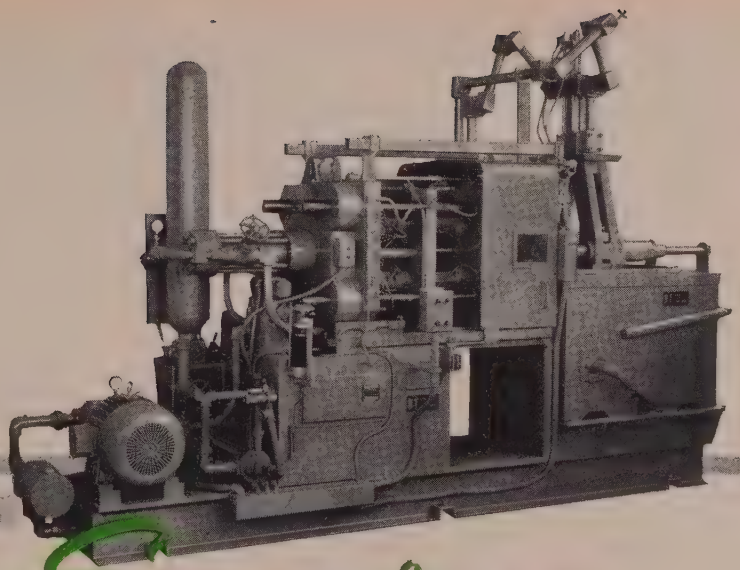

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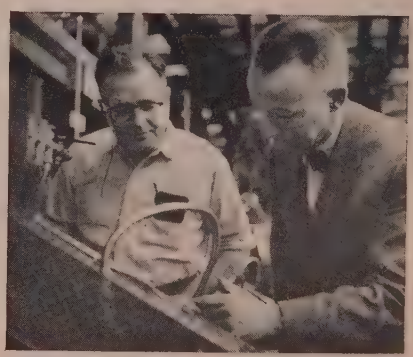

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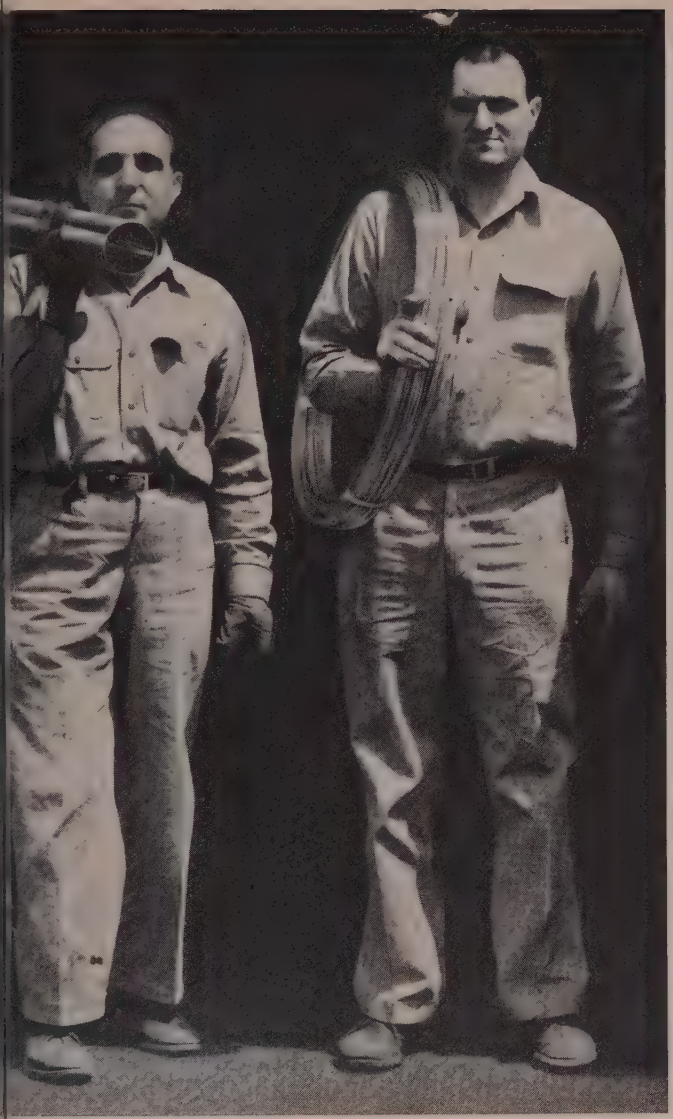

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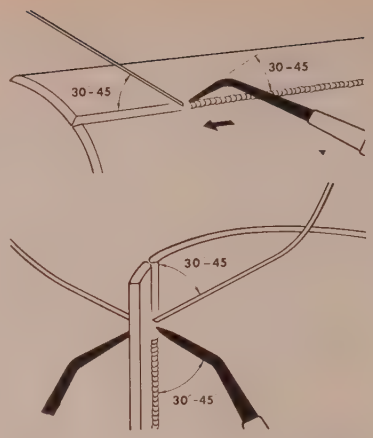
even less on lighter gauges) and be given a forward motion only. For material 3/16-inch and more in thickness, the torch should be held at a higher angle (approximately 45°) and should be given a lateral motion to ensure even distribution of weld metal.

The welding rod or wire should be dipped into and withdrawn from the weld puddle at regular intervals. Most weldors use this motion to stir or agitate the puddle, and feel through the welding rod the penetration obtained.

When welding in the horizontal position the torch and welding rod are held as they are for welding in the flat position. Some manipulation of the welding rod and torch is necessary to help build up the weld. Avoid welding horizontal butt joints.

When welding in the vertical position (Fig. 3), the angle between work and flame, and angle of work to welding rod, is 30° to 45°. The torch is given a slight up-and-down rather than a lateral motion, and the welding rod or wire is added in the same manner as in the flat position.



■ *Figs. 2 and 3. Top (2) shows position of rod and flame when welding in flat position. Bottom (3) shows flames of two weldors working in vertical position.*

When welding aluminum ¼ inch or thicker by the vertical upward procedure, it is common for two weldors to work together, one on each side of the work. Their flames should be the same size and their work synchronized so that the weld progresses uniformly upward from the lower end of the joint. If two weldors are not available, use one weldor and one preheating operator.

Overhead welding is practical for aluminum and its alloys, but should be done by experienced weldors only. It is not usually employed on butt joints.

Metal Arc Welding of Aluminum

Metal arc welding is a process in which a d-c reverse polarity (electrode positive) electric arc is maintained between the work and a flux coated electrode which supplies the filler metal.

Metal arc welding can join aluminum and its alloys, but the inert gas-shielded arc processes are recommended first. In many respects metal arc is similar to these processes but it has the big disadvantage of employing an active flux which must be removed completely after welding.

However, metal arc is faster, causes less distortion, and requires less edge preparation than oxy-gas welding.

The minimum recommended parent metal thickness is about 0.125 inch. Metal arc welding is not recommended for applications where maximum resistance to chemical attack is required, or for welding aluminum-magnesium alloys unless aluminum-5% magnesium electrodes are used.

Standard d-c welding machines of the rectifier or dual-control motor-generator types may be used when metal arc welding. Minimum capacity should be 300 amps. Proper settings are obtained by adjusting the exciter current at maximum and then setting the welding current control at the desired value.

Standard electrode holders can be used, but electrodes should be heavily coated with a suitable flux, and thoroughly dried. The flux removes the oxide film, assists in the ionization of the arc gap, and adequately shields the weld puddle. The electrodes should be dried at 750°F for one-half hour immediately before use to eliminate free and combined moisture.

Quality electrodes, properly dried and used with the correct machine settings, should cause only a slight flux spatter. Flux coated metal arc welding electrodes come in alloys similar to 1100 and 4043 (filler material similar to 3003 is also available). Electrodes come in a range of diameters.

General pre-welding operations such as selection of type of joint, edge preparation, surface and joint cleaning, jigging, and preheating, apply to metal arc welding (these will be detailed in Part 8, "Welding Aluminum"). Tee, lap and edge joints are not recommended unless the joint is sealed by welding all around the faying surfaces.

Spacing in metal arc welding is important. When welding from one side only, clean backing strips (aluminum, stainless steel, etc.) may be employed to allow higher currents and greater penetration. In making long welds, the groove form in the backing strip should be rectangular—an inch wide by 1/16 inch deep. Be sure to place the joint centrally over the groove.

Weld in the flat position whenever possible, using the step-back procedure to minimize distortion. Welding in the horizontal position may be done when necessary. When making horizontal fillet welds it is best to tilt the joint about 20° downwards, and weld in the downhill direction.

(*Continued on page 74*)

TABLE 3: Specifications for Metal Arc Welding Aluminum

Parent Metal Thickness, Inches	Type of Weld	Electrode Diameter, Inches	Approximate Direct Current, Amperes①	No. of Passes	Electrode Consumption, lbs./ft.
3/32	Butt	1/8	70	1	0.05
	Fillet	1/8	75	1	0.07
1/8	Butt	1/8	80	1	0.06
	Fillet	1/8	95	1	0.08
3/16	Butt	5/32	120	1	0.10
	Fillet	5/32	140	1	0.15
1/4	Butt	5/32 - 3/16	160②	1	0.15
	Fillet	5/32 - 3/16	180②	1	0.20
3/8	Butt	3/16 - 1/4	200②	2 - 3	0.25
	Fillet	3/16 - 1/4	220②	2 - 3	0.35
1/2	Butt	1/4	250②	3	0.35
	Fillet	3/16 - 1/4	275②	3 - 4	0.40

NOTES: ① Reverse polarity (electrode positive) is used when metal arc welding aluminum and its alloys.
② Preheating to 150° to 200°C (300°-400°F) may be advantageous.

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The vertical downward procedure is generally preferred when metal arc welding vertical butt and fillet joints. Overhead welding by the metal arc process should be avoided if possible.

Welding current and size of electrode employed depend largely on the thickness of the material to be joined. High welding currents cause excessive spattering and undercutting, as will a long arc. On the other hand, poor penetration and a high narrow bead will result from a low welding current (see Table 3).

Before striking the arc, remove the flux coating on the tip of the electrode, then brush the electrode on the joint as if striking a match. Once the arc is struck, quickly move the electrode to an almost vertical position.

Arc length should be as short as possible—practically snuffed out. This short arc may be recognized by a continuous steady, frying sound without spatter. Too long an arc will cause poor penetration, spatter, and waste of heat. It may be necessary to bear down on the electrode to crush or break off the flux as the rod is consumed.

Electrode manipulation is very important. In the flat position the electrode should be held nearly vertical until a puddle has been established. Then it should be tilted forward from 0 to 30° from the vertical (tip of electrode pointing towards completed weld) so that the electrode is always at right angles to the crater and in line with the joint.

Welding in this position is continued until the end of the joint is approached. Then increase welding speed and reverse the position of the electrode through the vertical to 0 to 30° backwards (tip of electrode pointing in opposite direction). The crater is then filled by gradually reversing the direction of travel and withdrawing the electrode.

Weaving the electrode is not usually recommended. However, it may be advantageous to give the electrode a slight slow sidewise motion when welding very heavy material.

Aluminum Welds Quickly

The speed at which aluminum and its alloys are welded by the metal arc process is approximately three times as fast as that obtainable when welding steel of an equivalent thickness. When using the recommended size electrode and a suitable welding current and technique, the welding speed should be adjusted to produce satisfactory penetration and reinforcement.

Changing of electrodes should be done quickly as follows: Break arc instantly, leaving a large crater; insert new electrode and restrike arc immediately at open end of crater; then move electrode back to fill the crater and resume welding, moving forward.

The flux will remain molten for a few seconds after the arc is broken and if the arc is restarted soon enough it may not be necessary to remove flux from the crater area. If the flux solidifies, removal by chipping and wire brushing is necessary.

When more than one pass is required from one or both sides, it is essential to chip and wire brush to remove all the flux left from the earlier pass. The stresses resulting from laying one pass over another are partially relieved by the heat of the additional pass.

Care must be taken to have subsequent passes penetrate 40 to 60% into previous passes to eliminate slag inclusions. This is particularly necessary when welding from both sides when the first pass should penetrate 70% or more through the joint and the pass from the other side should penetrate 60% through from the opposite side.

Adequate interpenetration of the weld passes is necessary to prevent porosity and inclusions.

It is easier to remove the slag-like coating of flux from a cooled weld. To do this, use the point of a chipping hammer to scrape along the edges of the weld and then wire brush it.

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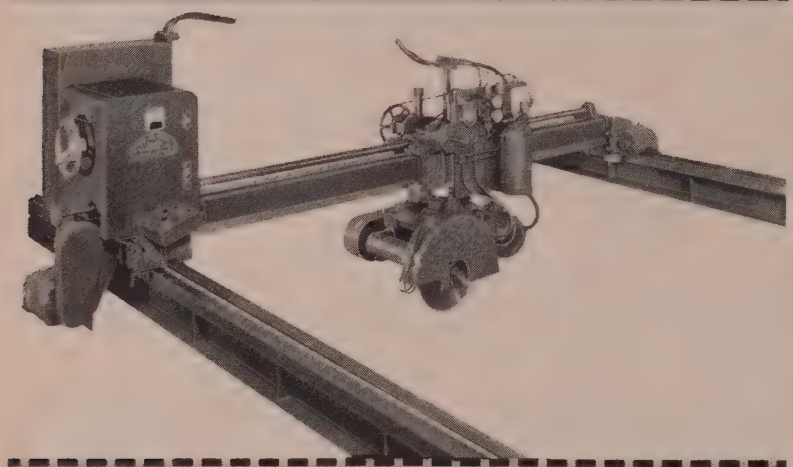

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Adhesive Bonding Storm Doors

ADHESIVE bonding is a key step in the manufacture of aluminum pre-hung combination storm doors at Wepco Division of The Weatherproof Co., Litchfield, Ill., because it contributes to a higher quality product while reducing manufacturing costs.

In "chemically fastening" the aluminum sheet kick panel to the extruded door frame section, Wepco quickly and efficiently joins two forms of aluminum. In addition, however, the process also seals the joints against moisture; secures a rubber strip to the metal; adds vibration damping characteristics; produces smooth, unbroken surfaces at the corners; eliminates metal-weakening holes; and does away with local stress concentration, thereby improving resistance to vibrational fatigue.

All need for final touch-up and post-finishing operations is eliminated by the use of a special aluminum-colored adhesive, Bondmaster G568, manufactured for this process by Rubber & Asbestos Corp., Bloomfield, N. J.

The adhesive is poured into common polyethylene squeeze-type dispensers for easy manual application as shown in the accompanying photographs. The bond sets swiftly at room temperature and reaches ultimate strength in 24 hours.

To determine the proper formulation to replace the costly and laborious use of conventional screws for this fastening operation, Wepco conducted extensive tests. To test the strength of the finished product, doors were slammed more than 257,000 times without adversely affecting the bond. Moreover, since their doors are distributed nationally and are subjected to widely varying climatic conditions, they also made certain that this formulation would withstand variations in temperature and humidity.

The test results showed that by using this adhesive bonding process, Wepco can maintain quality standards in its storm doors and at the same time boost production and realize substantial savings in materials and labor.

■ *Adhesive is applied (insert), and kick panels inserted.*

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Extruders hear lectures on

ALUMINUM CASTING TECHNOLOGY
ALUMINUM DEVELOPMENTS ABROAD

at meeting in Philadelphia

SPECULATION about extrusion prices, the sagging demand for aluminum storm windows and doors, and prospects for lower primary aluminum prices dominated most informal chatter at an extruders meeting last month.

Sponsored by the Aluminum Extruders Council, the meeting was held September 18 through 20 at the Sheraton Hotel in Philadelphia. In attendance were some 100 representatives of independent extruders, primary aluminum producers and other suppliers.

One independent extruder succinctly summed up the feelings of most of his colleagues when he wryly observed: "A lot of us are not overly busy these days." Others bemoaned the loss of business resulting from the slump in the storm window and door business.

With this mainstay of the extrusion industry limping along at about 30% below last year's volume, many an independent extruder is belatedly on the prowl for contract jobs in other fields. This explains, in part, the inordinate interest apparent among extruders who toured the Michael Flynn Manufacturing plant during the meeting.

Michael Flynn has chalked up a noteworthy record in bagging sizable contracts for curtain wall jobs and the like. But this type of work requires substantial fabricating facilities and is beyond the grasp of many extruders.

The rumor mill was as busy as usual. A few extruders confided that they had heard that lower primary aluminum prices are in the offing. Another said that one of the producers would abandon its commodity pricing practices. Still another said that one producer will stop book pricing and start selling metal for what it will bring.

And there was the inevitable talk about the industry firming up extrusion prices to the point where they would come close to so-called published prices.

Extruders who attended "Technical Seminar No. 1" got a lesson in the fundamentals of casting aluminum. It was delivered by John W. Wall, president of Permanent Mold Die Co., Inc., a leading supplier of molds and dies for casting and extruding.

"The one area of greatest advancement has been the casting field," he said. "With recent technological developments in new casting processes, tools and alloys, the future of the aluminum foundry looks bright."

Noting that the most progress has been made in permanent mold and die casting, he attributed this to the high production requirements of the automotive market.

"The permanent mold method is used to cast a large number of parts that require closer tolerances and better surface finish than can be obtained by sand casting," he explained. "Since the chilling rates are much faster than in sand molds, production is faster.

"A distinct advantage of the permanent mold process over die casting is the possibility of using sand cores for re-entrant cavities and/or the use of collapsible segmented cores," Wall said.

"Because of the lack of the high pressure used in die casting the permanent mold die is considerably less expensive to build. It is usually machined from cast iron, whereas the die casting die is made from hot work die steel."

Perm-Mold Variations

Wall briefly described some variations of permanent mold casting: The semi-permanent mold method in which part of the casting is formed by sand; centrifugal casting in which the mold is rotated during pouring and solidification; and low pressure permanent mold casting in which the mold is placed above an airtight furnace which is pressurized, forcing the molten metal through a tube into the mold from below.

PMD's John Wall

"Unless the U. S. businessman takes the initiative the trend to large corporate facilities and hot metal contracts will continue."

"This process makes it possible to simplify the gating and minimize the risers, thus increasing the ratio of net casting to the amount of metal poured," Wall added.

Turning his attention to die casting, Wall noted that this method is used where long production runs are involved, and where very good surface finish and close dimensional tolerances are required.

"The upward trend in the production of die castings has paced the entire casting industry," he continued. "Casting is the shortest route from raw material to finished product, and die casting often does it faster and cheaper than any other casting technique, especially when keyed to high production runs."

Predicting a great increase in the use of aluminum die castings, chiefly because of the automotive industry's expanded use of aluminum in transmission cases, power steering, brakes, heads, manifolds and engines, Wall noted that the trend is toward the production of larger castings. "With the cylinder block already a reality, the casting of the dashboard and firewall and even body parts is feasible," he declared.

In conclusion, Wall pointed out that between 1948 and 1958 the production of aluminum in the U. S. increased 205%. "In the next 10 years it will increase at an even greater rate," he said.

"The equipment is available. The time to take advantage of new and improved methods is now. Unless the U. S. businessman takes the initiative, the trend to large corporate facilities and hot metal contracts will continue."

Earlier in the day, a brief discussion of aluminum developments abroad was presented by Fritz Rosenthal of Associated Metals & Minerals Corp. A summary of Rosenthal's remarks follows.

The general economy of Western Europe has been booming. Consequently, the consumption of aluminum has gone up. The same is true of Japan. Consumers in Europe are viewing the prospects of their industry very optimistically. This is not astonishing because per capita consumption there is much smaller than here.

The most important development has been the impact of American producers, which has shown itself in two ways:

First, increased exports of aluminum pig and scrap from the U. S.; and second, the acquisition of fabrication facilities by American producers which

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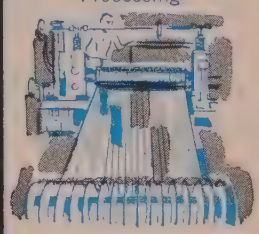

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Extrusions in Europe

The use of aluminum extrusions abroad is still very much behind the scale in the U. S. During 1959 the total quantity of aluminum delivered to the building and construction industry—the principal market for extrusions—amounted to only:

19,000 metric tons in Germany; 2825 in Belgium; 12,000 in France; 11,400 in Italy; 23,000 in England; 13,400 in Austria; 4800 in Switzerland; and 2700 metric tons in the Netherlands.

To put this into proper perspective, total aluminum shipments to all industries during the same period amounted to: 290,000 tons in Germany; 37,000 in Austria; 195,000 in France; and over 300,000 tons in the U. K.

Statistics on American and Canadian exports are published regularly, but you may be interested in Russian export statistics. In 1959 Russian aluminum exports to the free world dropped off substantially from 1957 and '58. I believe that 1960 stastics will show even smaller Russian exports.

It would appear that Russia had a temporary aluminum surplus, which by now has been taken up by new fabrication facilities inside Russia. Total aluminum exports from Russia to the free world in 1959 were only 34,700 tons, of which about 17,000 tons went to England; about 6500 tons went to the Netherlands; and about 7000 tons went to Finland. (In the first half of 1960, only 2000 tons were shipped to England.)

Russia's exports of aluminum to Communist nations during '59 were 41,000 tons, the bulk of which went to East Germany.

Red China has become a relatively large importer of aluminum, but according to Russian statistics they received only 300 tons from Russia last year. Red China bought in France, Norway and other Western countries.

A potentially important development is in the two common market agreements in Europe, the Inner Six and the Outer Seven. Their external tariffs may be sharply reduced if a reciprocal agreement is reached at the GATT meeting. This would benefit American and Canadian aluminum exporters.

Since the extrusion industry has always been interested in having alternate sources of aluminum available from abroad, I was surprised that (at the last meeting of the AEC) it was decided not to take any action in connection with the American GATT negotiations for lowering the tariff on pig aluminum.

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Improved methods, new tests upgrade

ANODIZED ALUMINUM AUTO TRIM

by
W. C. Cochran
E. T. Englehart
D. J. George*

To spur acceptance of anodized aluminum in auto trim and other uses, Alcoa research has come up with new bright finishing alloys, procedures that enhance image clarity, better sealing methods, and more reliable tests. Automatic car wash concerns are being urged to use new cleaners that are compatible with aluminum.

RESEARCH and development have long been aimed at improving aluminum alloys, finishing techniques and testing procedures for anodized parts used to decorate automobile exteriors and to enhance other products as well.

Aluminum Co. of America has been active in this experimentation. It produced currently used bright finishing alloys 5357, 5457, 5557 and 6463. And it now has improved finishing procedures and revamped an evaluation test designed to assure good appearance and performance of bright anodized trim.

Though Alcoa has made strides toward eliminating problems surrounding the use of this trim on autos, other problems exist.

Large volume production of trim parts has brought about increased use of fully automatic, high output finishing equipment. Existing finishing procedures are commercially feasible, but certain operations require a degree of process control which is difficult to maintain under high volume conditions. There remains a need for finishing procedures that can be more readily controlled with high volume production equipment and that will permit obtaining the optimum finish on the various aluminum alloys.

This problem exists, but let's examine the progress Alcoa has made in other areas.

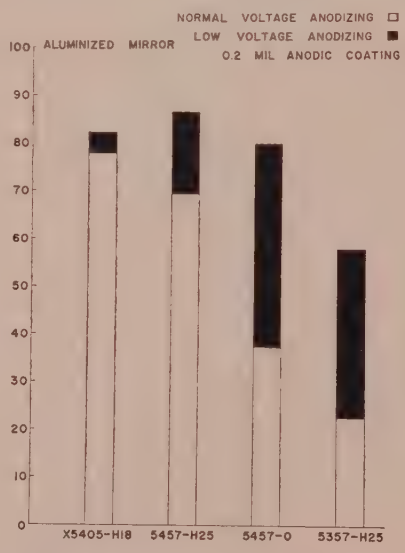
For Better Image Clarity . . .

Image clarity of bright-anodized aluminum has been one primary consideration for many applications. Alcoa has found that by using a 15% H_2SO_4 (sulfuric acid) electrolyte and anodizing voltages in the range of 10-12 volts, image clarity is markedly improved over that of anodic finishes produced at 14-16 volts in the same electrolyte.

For a current density of 12asf, the lower formation voltages can be achieved by using an electrolyte temperature of 84 to 88°F.

(Example: By using a 15% H_2SO_4 electrolyte at 84-88°F with a current density of 12asf, a higher image clarity generally is obtained than when coatings of similar thickness are produced in the same electrolyte at the same current density, but at 70°F, at 15-16 volts.)

Improved image clarity is particularly evident with annealed metal or metal which may not develop its maximum image clarity when anodized at higher voltages (See Fig. 1). Alloy 5457 shows greater image clarity than the predecessor alloy, 5357; also, with the lower voltage anodizing technique, 5457 can have image clarity approximating that of alloy X5405. Alloy 5557 would be similar to 5457 alloy.



■ *Fig. 1. Graph shows improvements in image clarity effected by use of low voltage anodizing technique. Results are based on single lots of metal. Some deviation would probably occur with different lots of these alloys.*

Sealing plays a very important part in the performance of anodic coatings. Sealing involves plugging or capping over the multitude of tiny pores in the oxide coating.

In the case of the conventional boiling, distilled, or deionized water seal, the mechanism is known to be hydration of the aluminum oxide to the alpha monohydrate. With certain metal salt sealing solutions, the mechanism is considered a combination of hydration and occlusion of the hydrated metal oxide in coating pores.

Which Seal Is Best?

Both the boiling water and metal salt sealers have been used for sealing anodic coatings. However, the latter type has, until now, been used primarily for anodic coatings colored by dyes.

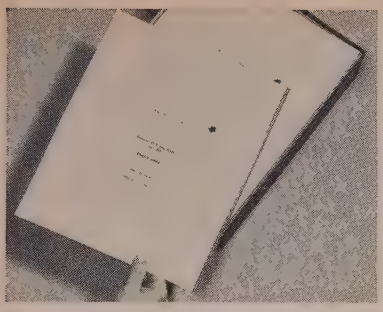
A boiling water seal is very effective. However, recent work has shown that the nickel acetate type sealer is less affected by certain contaminants which can retard or prevent sealing in boiling water. Other advantages of a nickel acetate sealer include lower temperatures and shorter sealing times.

Previously, metal acetate sealers had formed a smudge on the surface of the coating which necessitated a special removal step. But with the addition of new proprietary, anionic-type wetting agents to nickel acetate sealers, the smudge can be minimized or even eliminated.

A 2g/l nickel acetate sealer containing a suitable wetting agent has been found to adequately seal anodic coatings ranging from 0.1 to 0.3 mil thick within 5 minutes at 195-200°F, at a pH of 5.5 to 5.8.

The use of the nickel acetate sealer reduces processing time and cuts the cost of heating over the boiling water seal, sometimes used for 15 minutes. Outdoor exposure test results (4 years) show that anodized material performs

*Respectively, Assistant Chief, Finishes Div'n, and Assistant Chief, Chemical Metallurgy Div'n, Alcoa Research Laboratories; Section Head, Finishes Div'n, Alcoa Process Development Laboratories.



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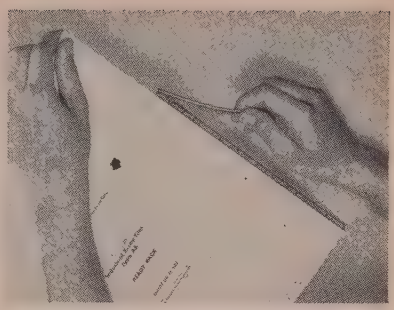

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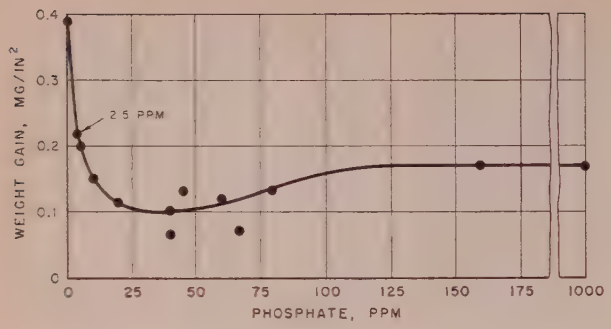
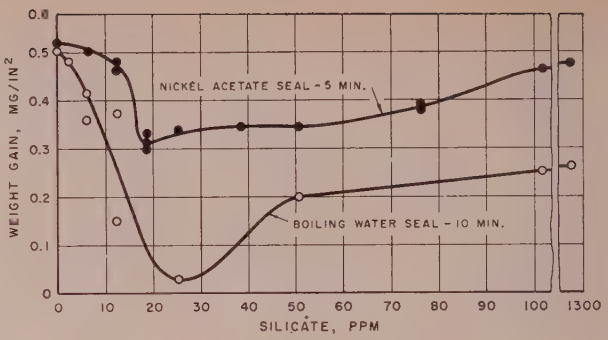


■ *Fig. 2. Effect of phosphate contaminant in boiling water seal on weight gain by 0.2 mil anodic coating.*



■ *Fig. 3. Effect of silicate contaminant on weight gain of 0.2 mil anodic coating.*

satisfactorily when the nickel acetate seal is used.

The presence of small amounts of certain anions—phosphates, fluorides, silicates—in the sealer can adversely affect the sealing of anodic coatings.

The phosphates were found to be particularly harmful (See Fig. 2). The weight gain on sealing has been used as an indication of the degree of seal of the coating. It is apparent that a phosphate content as low as 2.5 ppm markedly reduces the weight gain (or hydration) of the coating upon sealing in boiling water. The nickel acetate sealer can tolerate as much as four times this amount of phosphate contamination without seriously affecting the quality of the seal.

As little as .5 ppm fluoride content in boiling water will prevent adequate sealing of anodic coatings. Up to 15 ppm can be tolerated in the nickel acetate seal.

Silicates are also harmful to sealing. Figure 3 illustrates that with increasing silicate (expressed as ppm SiO_2) content, the weight gain of the coating on sealing in water decreases. The presence of 15 ppm SiO_2 reduced the weight gain by about 50%. However, the nickel acetate sealer is much less affected by silicate contamination than a boiling water seal.

Ion Exchange Helps, But . . .

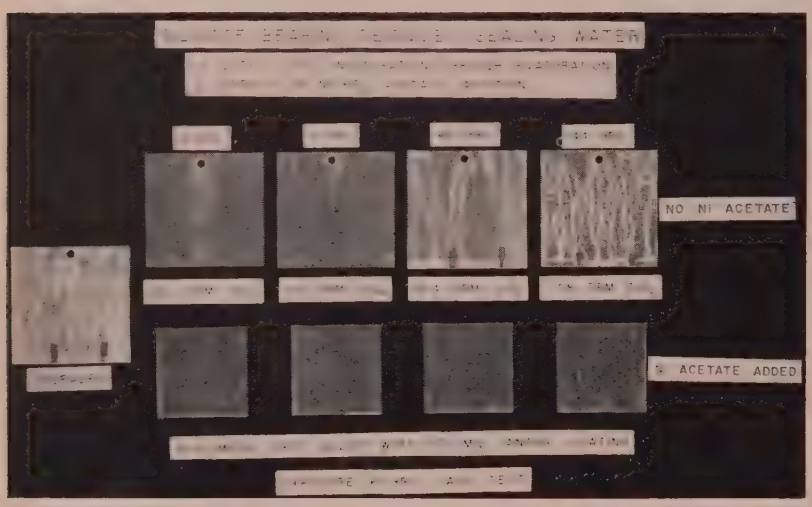
One method of maintaining the purity of sealing water is by continuous ion exchange. However, conventional weak base anion and cation exchangers may not remove SiO_2 contaminant. This problem can be rectified by using a strong base anion and a weak base cation exchanger. In this case, the pH of the effluent water may be too high owing to sodium slippage. The latter problem can be solved by incorporating additional exchange cartridges for removal of the sodium to give an effluent having a suitable pH.

Figure 4 illustrates the harmful effect of the build-up of SiO_2 in a sealing tank constantly charged with deionized water from a weak base anion-weak base cation system. Samples of water removed from the sealing tank at different SiO_2 levels were used to make up nickel acetate sealing solutions. Samples subsequently sealed in the nickel containing solutions are also shown.

Apparently the resistance of the nickel acetate sealed specimens to the copper-modified acid salt spray test is superior to that of the boiling water sealed specimens, when the sealing solutions are contaminated with silicate.

This particular accelerated corrosion test was selected from methods currently in use as a comparative evaluation of the degree of sealing of the anodic coating. Use of a nickel acetate seal eliminates costly continuous ion exchange systems. Of course, the nickel acetate sealer should be made up with and replenished with distilled or deionized water of suitable purity.

Alcoa has found the causes for some inconsistencies in results obtained with the ASTM B136-45 test for sealing of anodic coatings. The phosphate content of the Anthraquinone Violet RN dye used varies considerably. As the phosphate content of the dye test solution increases, the ability of the dye to stain unsealed or partially sealed anodic coatings decreases. This naturally leads to erroneous conclusions concerning the quality of the seal being tested.



■ *Fig. 4. Specimens illustrate that increasing amounts of silicate contaminant in deionized water interfere with sealing of anodic coating and that nickel acetate increases the tolerance for silicate contamination. While Cass Test was not developed for aluminum alloys and is not indicative of service performance of anodized aluminum trim, it does provide a relative measure of the degree of sealing.*

Limit Phosphate Content

It is recommended that the phosphate content of the dye test solution be less than 10 ppm. Also, the pH of the dye test solution should be maintained at 7.0 ± .5; and after the dye solution has been applied for 5 minutes, the test area should be rubbed with pumice powder and a wet cloth rather than soap, as indicated in ASTM B136-45.

For some time, the automotive industry and aluminum producers have been trying to establish an acceptance test for anodized aluminum trim that is relatively fast, reproducible and reliable.

The industry has been using the neutral salt spray test. However, this requires a relatively long period of exposure and lacks the desired reproducibility. Despite these disadvantages, the neutral salt spray has probably been the

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The direct chill method of casting has practically eliminated all of the objectionable defects that are present in most static castings. Because of the controls available to vary the casting conditions, billets cast by this method are particularly sound and free from segregation, porosity, and inclusions. Grain size and structure can be controlled or varied for different applications.

Direct chill casting is accomplished by pouring molten metal into an open end, water cooled mold that is closed at the bottom by a movable block. As the metal solidifies sufficiently to form a skin, the bottom block is lowered at a controlled rate and the direct chill casting is in process. A wide variety of shapes and forms is possible to cast in bar lengths replacing individual castings, resulting in considerable savings in machining and fewer rejects because of casting flaws.

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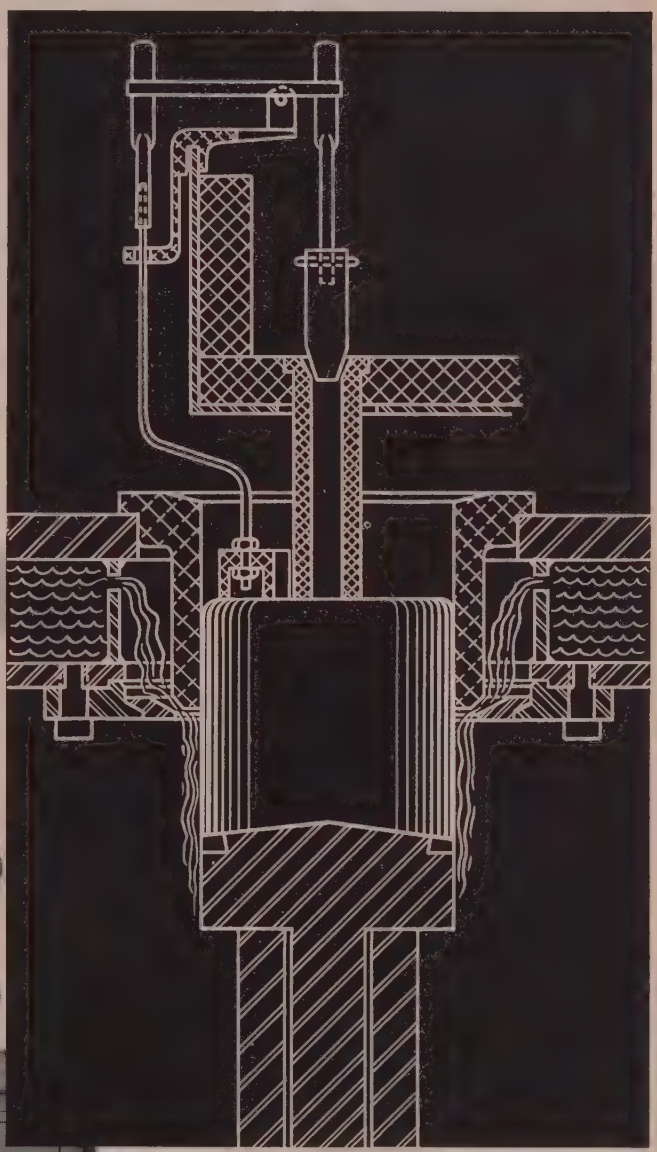

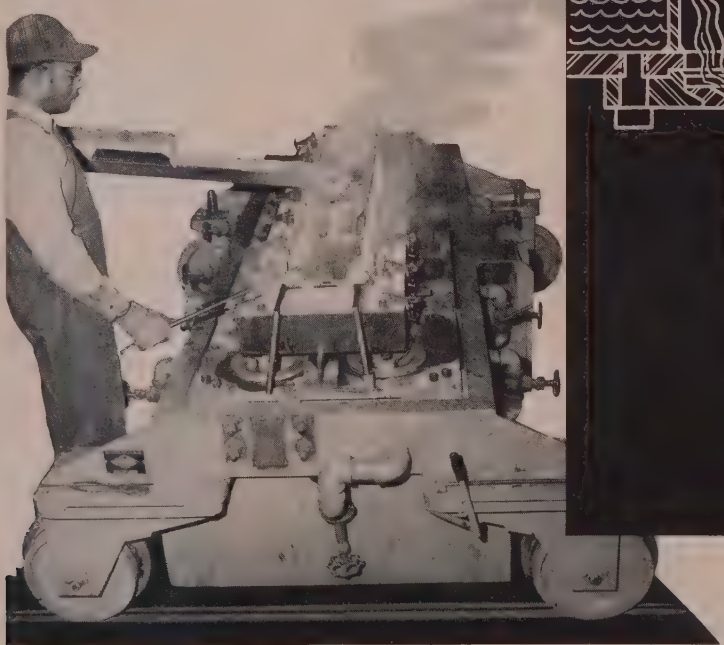

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most reliable test available for use with anodized aluminum trim.

During the past several years, other accelerated acceptance tests, including the acetic acid salt spray, the copper modified acid salt spray (Cass Test) and the Corrodkote Test have been tried. None of these tests, while reportedly appropriate for use with chromium plated parts, for which they were developed, have been completely satisfactory for determining the quality of anodic coatings on aluminum alloys.

New Test for Aluminum

In an effort to establish a test directly applicable to anodized aluminum trim, Alcoa has developed a new approach to quality control tests. This test is electrochemical in nature and evaluates all the factors contributing to the quality of an anodized aluminum part. Factors such as sealing, coating thickness, coating density, and continuity of coating are integrated and can be evaluated.

While this approach appears to be a reliable method of testing anodized aluminum sealed in boiling water, it must be evaluated further to establish its suitability as an industrial quality control technique.

The test is conducted at room temperature. The procedure is as follows: The anodized aluminum part is immersed as an electrode in a 1½% aqueous solution of sodium carbonate along with a piece of low carbon (.06%) steel which serves as a second electrode.

Both electrodes are masked with an inert material, exposing only an area of one square inch. These electrodes are then electrically coupled through a recording microammeter. The time necessary for a current of 20 microamperes to flow is recorded.

By testing four samples of the anodized aluminum part it is possible to obtain a reproducibility of 95%. In other words, the average of four specimens of satisfactory quality will fall within a statistical band with a probability of 95%. Coatings of unsatisfactory quality will fall below this band.

This test can be conducted within one hour on the types of anodized aluminum currently used for automotive trim.

Aluminum alloys are relatively easy materials to clean but like all other metals they have their own characteristics and certain precautions must be taken. To select proper cleaners, it is important that the differences between the characteristics of aluminum alloys and other trim materials be understood.

Aluminum alloys have a high inherent resistance to corrosion. However, there are certain cleaning agents that can cause adverse effects. Anodizing further improves the corrosion resistance of alloys. Nevertheless, cleaning agents which harm unprotected aluminum may even damage anodized articles.

In general, cleaners that are compatible with the body paint system are also satisfactory for use with aluminum automotive trim. This has been confirmed by many tests indicating that window cleaners, bug and tar removers, abrasive cleaners, waxes, and polishes are compatible with aluminum trim. However, it is possible that certain steam cleaners can be harmful to all body members.

To determine the effects of steam cleaners on aluminum trim as well as methods of alleviating this problem, a test procedure was established at Alcoa Research Laboratories.

In this test, steam or steam with various additives was aimed continuously at 40 psig for 10 minutes on the surface of the test piece. The specimen, placed directly in front of the steam nozzle and about 12 inches away from it, reached a temperature of 145°F. Solutions containing 3% of various additives were used and provided a final solution strength of about 0.2% when mixed with the steam.

Ten proprietary cleaners were tested using this procedure. Of these 10 cleaners, six had no effect on anodized trim parts. The remaining four had some effect which varied from whitening of the anodic coating to complete removal of the coating in one case.

Similarly tested were 16 chemicals used as component parts of steam cleaner compounds. Seven of these, including secondary sodium phosphate and sodium tetraphosphate, had no visible effect on the anodized aluminum. The remaining nine, sodium carbonate, trisodium phosphate and sodium hydroxide had the most adverse effect. In all cases, live steam alone had no effect on the anodized specimens.

New Compatible Cleaners

Since it was apparent that certain proprietary cleaning compounds, as well as some of the components of steam cleaning compounds, had adverse effects on aluminum members, the formulation of cleaners compatible with aluminum was attempted. Of eight such compounds, six had no significant action on anodized aluminum specimens. In addition, these compatible cleaner compounds were found to clean soiled automotive parts just as effectively as some of the non-compatible compounds.

On the basis of this laboratory work, efforts to substitute steam cleaners compatible with aluminum for the non-compatible materials now being used are being carried out in co-operation with the Automatic Car Wash Association.

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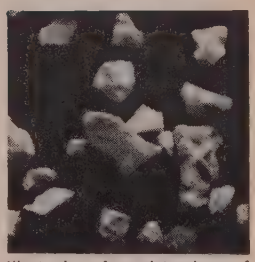

Illustration of angulate shape of H-W Flintgrain enlarged x3

H-W Mullite Grains and Flours for precision molding of metals at extremely high temperatures

These H-W Mullite products by virtue of their high-alumina composition and low content of basic oxides are exceedingly refractory. The hard dense grains are strong and most resistant to fluxing. Excellent thermal stability accounts for their unusual constancy of volume up to their temperature limit. The maximum thermal expansion of these mullite products is approximately 0.6 per cent which is less than half that of silica sand. These are the properties which make them especially suitable for precision casting work at high temperatures with particular benefit for various non-ferrous and ferrous alloys.

Illustrated here is a typical two-part mold in H-W Mullite material made for the precision casting of a beryllium-copper alloy.

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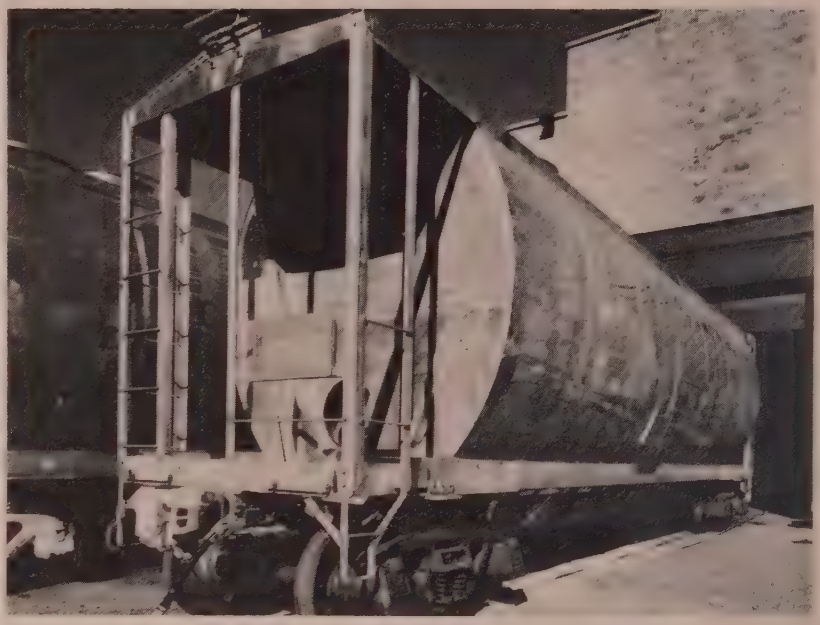


Rounded Hopper Easier to Build, Unload, Clean

The first four all-aluminum railway covered hopper cars, embodying a new design principle that permits a ten-ton payload increase over previous types made their debut in Canada last month.

Aluminium Limited developed the new Alcan Tank-Hopper cars with the cooperation of Canadian National Railways for the transport of chemicals, foodstuffs and refined ores. They were built by Marine Industries Limited; Sorel, Quebec.

Key design feature of the cars is a curved side, which offers significant advantages in simplified fabricating procedures and easier unloading and cleaning. Design is expected to make cost per ton of capacity lower than conventional steel equipment because the curved shape permits the least amount of metal to enclose the largest volume of space. This results in a 10% reduction in the number of cars in any given operation, Aluminium pointed out.

The new design eliminates the side posts and the full length of the center sill between the bolsters. As a result, it permits a sizable decrease in the amount of metal and welding footage, thus lowering construction costs.

Elimination of the central portion of the center sill, as it exists on conventional cars, removes restrictions on the location of the hopper outlets. Two cars for C.N.R. will have six steel Keystone type outlets arranged longitudinally along the car. The other two will have six aluminum Keystone outlets. The Alcan tank-hopper design may, however, be adapted to any outlet arrangement.

A unique feature of construction was the method of curving and attaching the sides to the body of the car. Rather than rolling the curve into the side sheets, they were welded in the flat condition and then simply fitted to the curved shape bolsters and partitions.

A further interesting aspect is the five-foot module used in the design of the car. The length and consequently the cubic capacity of the car can be increased or decreased by one module without any major design change, 3,500, 3,000 and 2,500 cubic feet capacity cars can be produced on the same jigs.

They will in addition be suitable for certain special ladings for which protective linings are now required in conventional steel cars. Car specifications follow: Gross weight, 210,000 lbs.; light weight, 17 tons; capacity, 88 tons; cubic capacity, 3,000 cubic feet. Minimum density required to give full weight on rail—59 lbs./cubic foot. Carries refined ores, chemicals, foodstuffs, polyethylene, lime, etc. and other bulk materials. Length is 45 feet over strikers.

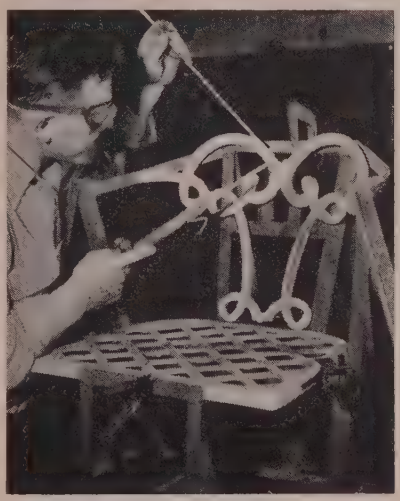
The Canadian development comes at a propitious time, when bulk-handling aluminum cars seem to be winning their spurs in the U.S. (See Looking Ahead, page 114).

Deburring Compound Speeds Cutting Action

A compound that combines moderate alkalinity with abrasives to deburr metals in tumbling barrels has been developed by Oakite Products Inc., 19 Rector St., New York.

The compound, Oakite FM182, incorporates 40 to 80-mesh abrasive to speed cutting action, thereby shortening deburring cycles in the finishing operation. The compound is said to have no adverse chemical action on metals, and often enhances the color of pieces.

Oakite FM 182 may be used in a range of 4 to 48 ounces per gallon of water, at room temperature, and for times varying with nature of work. It is recommended for severe cutting down operations.



New Casting Alloy Favors Metal Arts

Growing demand is reported for Adaptaloy, a new aluminum casting alloy developed at the Central Research Laboratories of American Smelting and Refining Co. Adaptaloy is unique in the high elongation and ductility it has relative to strength. This characteristic, developed without heat treatment or special practices, makes it especially suitable for castings which require cold forming or bending during assembly. Its high fluidity, good weldability and clear white color when anodized have favored it for art castings.

One company, manufacturing custom designed aluminum furniture for indoor and outdoor use, has switched to Adaptaloy for its entire production line. Aluminum Furniture by Sandfort, Inc., New York, caters solely to recognized interior designers and much of its output is custom designed. Consequently, assembly of the furniture involves a good deal of cold forming, bending and hand welding.

Formerly, a standard casting alloy was used but, though strong, it was also brittle and there was frequent breakage during bending and in transit. Since the company turned to the new alloy, the reject and breakage rate has been reduced to a fraction of one percent.

Lou Pellegrino, a partner in Industrial Castings Co., New Haven, Conn., the foundry that makes the castings for Sandfort, states that he has had no breakage – even in the course of rough foundry handling – since he started using the new alloy.

High fluidity during pouring combined with substantial strength, enables the foundry to cast, in delicate forms, such functional items as chair legs, 17 inches in length, tapering from several inches at the top to only ½ inch width at the bottom. Sandfort furniture, completed in a variety of finishes, is shipped all over the world.

Other foundries are successfully using Adaptaloy for such applications as religious figures, grilles which have to be bent to conform to various contours, clamps to pipes in a variety of diameters, boat-prow brackets which must be bent to conform to different shapes yet require high impact strength, and structural castings designed to bend under a specific load.

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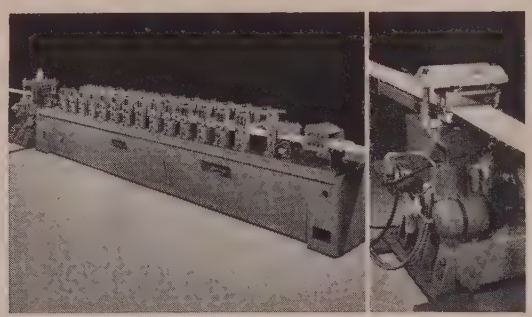

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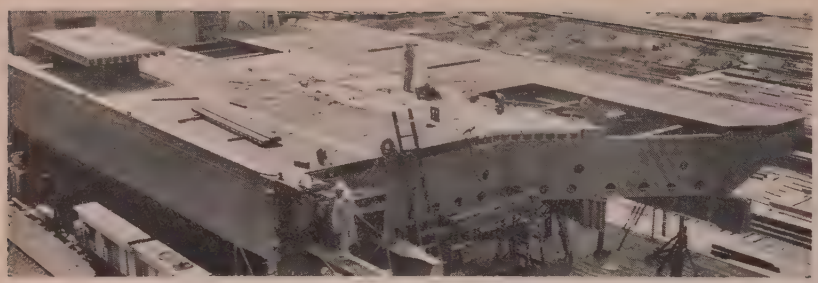

Aluminum Elevators Spot Deck of Giant Carrier 'Enterprise'

The *USS Enterprise,* first nuclear-powered aircraft carrier and largest ship in the world, is being completed in the yards of Newport News (Va.) Shipbuilding and Dry Dock Co.

The 1100-foot *Enterprise* will be armed with the most modern jet fighters ever designed for carrier service. To handle the jets, all plane-carrying elevators spotted along the giant warship's 252-foot-wide flight deck, are fabricated of aluminum extrusions and plate.

The four elevators are of all-welded construction, in Alcoa alloy 5456. Each (see picture) is 52 feet wide and 85 feet long, and weighs 105 tons — 30-tons less than high tensile steel. Lighter, less bulky machinery than normally used, will raise and lower the structures.

Newport News personnel designed the elevators, and originated fabricating techniques to meet strict weight and strength requirements. Each elevator was built around three load-carrying structural systems, with each system distinguished by the size of its I-beams.

All I-beams used were fabricated of plate ranging up to 2 inches thick, using a semi-automatic welding set-up.

Top grating of each elevator was fabricated by welding short lengths of T-shaped extrusions, spaced 1-½ inches apart, crosswise between 30-feet-long I-beams with 12 inch webs. This system rests on a secondary structure built of 16-inch-deep I-beams. The entire weight of each elevator is carried by huge 10-feet-deep beams that form the main structural support.

The carrier's eight nuclear reactors are expected to operate five years on the first charge of fuel.

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GE Foil-Wound Transformer Helps Power Alcoa Plant

A foil-wound power transformer manufactured almost entirely from aluminum has been developed by General Electric Power Transformer Dept., Pittsfield, Mass., and a prototype of the step-down unit has been bought by Alcoa to help supply power to its Massena, N. Y., fabricating works.

The unit, said to be the first of its type, is rated OA/FA-T-60-15,000/20,000 kva, 115 kv to 13800x6900 volts.

The prototype, which took two years to build, has No. 3EC alloy aluminum foil windings in addition to an aluminum tank and radiators. Only non-aluminum parts are the core and some mechanical accessories.

Many unique engineering and manufacturing problems had to be solved to meet the application requirements of Alcoa, said N. E. Dillow, the GE department's marketing manager. The problem of winding more than 5½ miles of aluminum foil for the three-high voltage coils was solved by designing a special machine for winding foil for each phase.

Another problem required experimenting with ultrasonic welding, and a process was devised for welding transformer tap connections to the aluminum foil.

Dillow says the physical orientation of the conductor with respect to the kraft paper insulation provided transformer coils with good transient voltage characteristics. He also pointed out that the unit passed all standard factory tests prior to shipment. In regard to operating temperature, Dillow added, the unit performed "exceptionally well."

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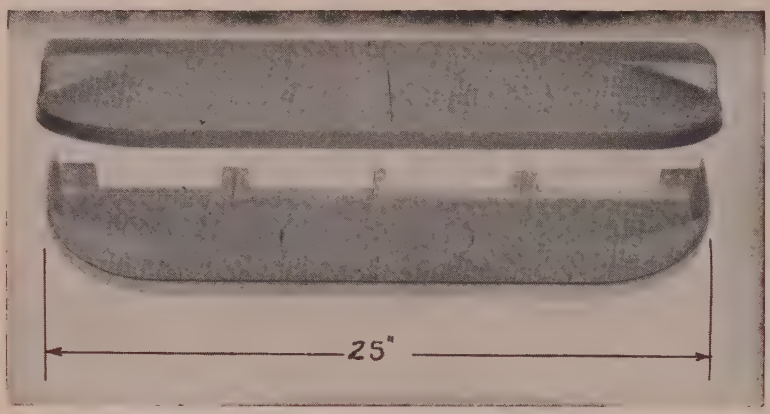

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Two New Metal Finishing Compounds Introduced

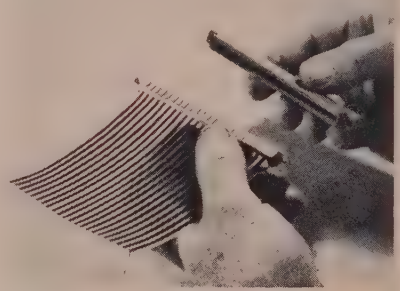
New compounds for aluminum finishing work have been announced by The Diversey Corp., 1820 Roscoe St., Chicago 13. One is a conversion coating compound, for applying a chromate film to aluminum to act as a paint bond; the other is to provide a zincate coating to aluminum before electroplating.

Divercoat 2-A produces a chromate conversion coating when the work is immersed for a short time in a solution of 1 to 3 ounces of the compound per gallon of water at room temperature. It conforms to MIL-C-5541 for immersion coatings. The protective coating develops from a chemical reaction between the metal surface and the solution. Depending on the alloy processed and operating conditions, the resultant coating ranges in color from iridescent yellow to light gold. Applications of the coating with Divercoat 2-A do not perceptibly alter work dimensions, even of closely machined pieces, Diversey reports.

The new Diversey zincate pre-electroplating compound, ZN-77, provides for lower use concentrations, faster drainage of solution from processed parts, reduced drag-out loss and greater tolerances to temperature variations.

"ZN-77 is a rapidly soluble, free-flowing granular material," Diversey said. "It doesn't cake under normal storage conditions."

Deposition of the zincate coating is quick, using ZN-77, as a result of a replacement reaction between the aluminum work and the solution. The film is fine but unusually adherent, Diversey said. Immersion times vary with the alloy being processed.



Contour Cable Being Marketed by Hughes

Two types of weight and space saving aluminum multiconductor cable, only .012-inch thick, and a variety of connecting devices are being marketed commercially by the industrial systems division of Hughes Aircraft Co.

Flexible flat cable called Contour Cable, was developed by Hughes to

meet rigid military performance specifications for all types of harnesses — interconnecting cables, rotary joint connections, moveable rack and panel drawer connections and other wiring configurations, the announcement said.

Etched and continuous Contour Cable is produced in a number of material combinations to meet any range of temperatures from −65°C. to +250°C., the company said. Etched cable designed to meet special equipment requirements can be delivered in any length or width not exceeding 48 by 48 inches to match special circuitry configurations.

Continuous rolls of unshielded, electrostatically or magnetically shielded cable are available. Widths up to 5½ inches in conductor sizes from 20 to 28 gauge with a variety of spacings also can be supplied. As many as 54 conductors per inch can be assembled in a single cable for micro-miniaturization application, Hughes reported.

Room Coolers Have Many Aluminum Applications

Leading appliance manufacturers have initiated an industry changeover by utilizing aluminum rear panels for current room air-conditioner models, according to Aluminum Co. of America.

D. P. Kennedy, head of the appliance section of Alcoa's Sales Development Division, said the manufacturers reported they specified aluminum for the rear panel because the light metal enabled them to improve the efficiency and appearance of their product.

Aluminum provides optimum efficiency by diverting direct sunlight, which has a load-lowering effect on the condenser. The louvered aluminum rear panel (condenser grille) protects the condenser from damage and eliminates corrosion which may stain exposed edges when other materials are used.

Uncoated aluminum is used since it resists corrosion without sacrificing quality in appearance.

Added to these benefits is aluminum's ability to maintain a pleasing appearance in salt water and industrial atmospheres.

Following is a list of aluminum applications for room air conditioners, according to Alcoa: Fins on evaporator and condenser coils are standard, as are condenser fan components and exterior decoration. Fan shrouds have been commonly used, but present use is limited; internal compressor parts (e.g., pistons and crankshafts) are aluminum, but not yet accepted by the complete industry. Bottom pans are in the development stage; and one manufacturer has produced a unit with an aluminum exterior casing. The latter is still considered to be in development, Alcoa reported.

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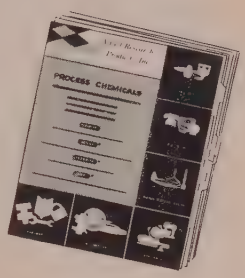
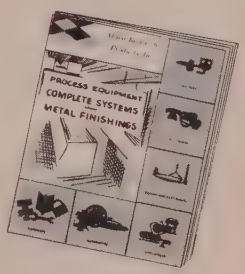


EQUIPMENT AND COMPLETE FINISHING SYSTEMS

Includes information on WAGNER Silicon and Selenium Rectifiers, WAGNER Auto-Loaders for transfer of racks and parts from conveyors to plating machines or between conveyors, Automatic and Semi-Automatic Plating Machines, Barrels, Tanks and other equipment.

Also includes information on Process Engineering Service—complete plant design, specification and installation.



CHEMICALS AND SUPPLIES

Price and delivery information on a wide variety of plating room necessities, including ROLL-TOP Zinc anodes, FLAT-TOP copper anodes, ELECTROCOP Flat Copper anodes, Cadmium and Tin Anodes, Acid Replacements, Buffs, Chemicals, Cleaners and Maintenance Materials.

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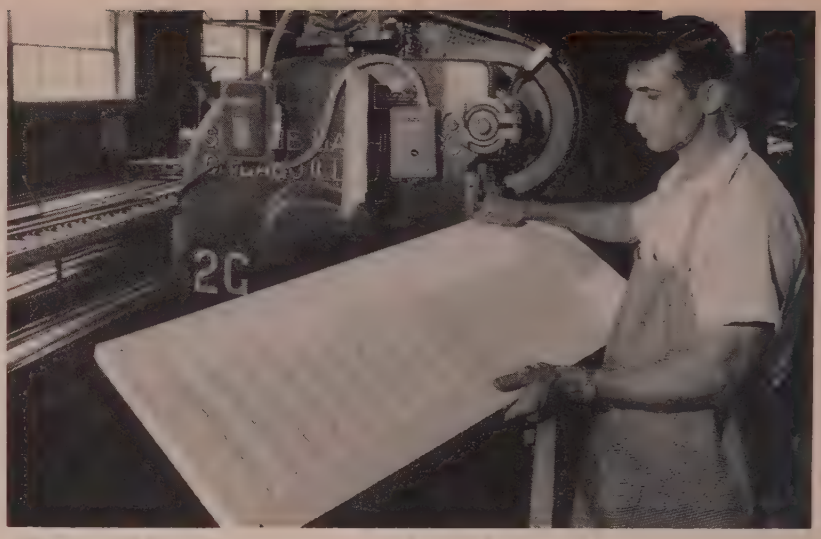


Window Manufacturer Launches Shutter Line

Aluminum shutters with baked-on enamel colors have been introduced by Century Mfg. Co., Houston, Texas, a large-scale manufacturer of aluminum windows, screens and thresholds.

The shutters are made from aluminum Colorweld sheet, pre-painted sheet product of Reynolds Metals Co.

This type of baked enamel finish is very durable, according to Tym Seay, Century president. Since the shutter is made of aluminum, which cannot rust and resists other types of corrosion, it will never need to be repainted for protective maintenance.

Century is offering the shutter in two conditions — colored polar white or tropical green, or with a prime-coat. With the latter, the builder or homeowner can add a surface coat of any color desired.

Each shutter is precision-made from a single sheet of heavy gauge aluminum and can never warp or rot. Open louvers permit free circulation of air through and behind the shutters.

Twenty-eight different heights of shutters, ranging from 2 ft., 5 inches to 6 ft., 11 inches, are produced to fit every size of window and door. All Century shutters are 1 ft., 4 inches wide and are easily installed.

Melting-Holding Furnace Features Safety, Convenience

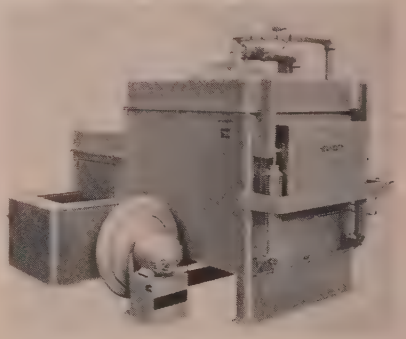
A new line of double chamber dry hearth aluminum melting and holding furnaces has been announced by Hevi-Duty Electric Co., Milwaukee, Wis. It consists of three furnace types designed for use in aluminum sand casting, die casting and permanent mold plants.

All three furnaces are of single unit construction with individual melting and holding chambers. Either gas, oil or combination fuel-fired, the furnaces feature separate firing systems in each chamber to assure rapid melting in one chamber and correct holding temperature in the other.

Direct firing on a sloping hearth in these furnaces makes possible fast melting and immediate run-off of molten metal into the holding bath.

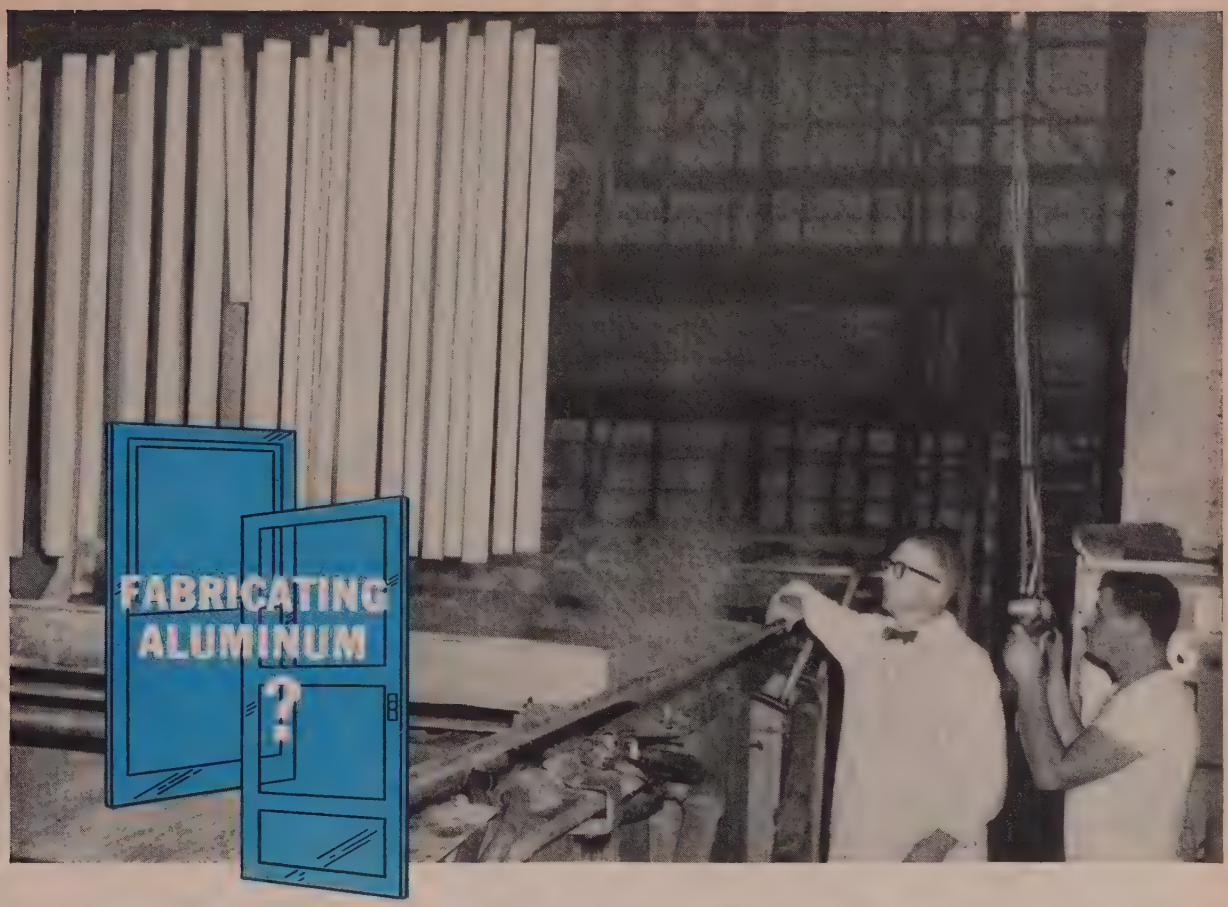
"Better metal quality is achieved as moisture is driven off before the aluminum reaches the holding chamber," a company spokesman said. "Oxides and other foreign materials present in gates, risers and scrap are deposited on the hearth during melting and can be removed with an occasional raking."

Fast, easy cleaning is gained through use of non-wetting refractory. All furnaces are built to withstand heavy production conditions. Steel plate shells are reinforced with structural shapes.



Several features contribute to operator comfort. Charging doors and dip-out wells are located at a convenient height. Breakdown burners are shut off during loading for less heat and increased safety. Dip-out wells are completely insulated to provide comfortable working conditions in the dip-out area.

Depending on size and type, these furnaces are capable of melting from 250 to 2000 pounds of aluminum per hour and holding up to 2000 pounds.



Pennsalt Cuts Metal Finishing Costs

with "work-together" chemicals and machines

Does your investment in metal preparation chemicals—$40,000 a year or more in a typical aluminum fabricating plant—really work well with the half million dollars' worth of equipment that uses these chemicals?

Your metal finishing dollars will go further when machines and chemicals are working together . . . the way they do when you use Pennsalt's System Approach to metal surface preparation. Because Pennsalt supplies both the chemicals and equipment, we can treat your metal finishing line as an integrated system. It's the "work-together" way to make your investment pay off in peak production, top quality and low unit cost.

And Pennsalt's Metal Preparation Service Plan makes sure you keep getting top performance, too. Personalized service from a nationwide organization analyzes your metal preparation needs, recommends the right "work-together" equipment and chemicals, aids installation and startup of automatic machines and follows up with regular service calls. Write for free Booklet 346, "The Pennsalt Metal Preparation Service Plan" . . . and see how we can help your metal finishing dollars stretch further.

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Year-Round Rink Roofed with Corrugated Sheet

The skating rink shown above will be a year-round haven for skaters from northern New York City and Westchester County. Recently dedicated in Yonkers, N. Y., the covered, dual-purpose rink — for ice skating in winter and roller skating in summer — promises to set a standard for recreation centers of its type in many communities.

The roof required more than 30,000 square feet of corrugated aluminum roofing (about 16,500 pounds) which was fabricated by Aluminum Co. of America. The roof panels were .032-inch thick and were supplied in various sizes up to 4 x 18 feet. They were installed by Abbot Roofing and Sheet Metal Works, Inc., New York, who fastened them over a framework of laminated timber arches. Regular aluminum wood screws were used.

Because the 220 x 120-foot rink is adjacent to the New York Thruway, Hopf & Adler, New York architects, specified a low-specular gloss finish for the aluminum to cut sun glare to a minimum. The translucent inserts in the roof provide daytime illumination. At night, interior lights beamed up through these inserts create a beacon for pleasure-bent Westchesterites and New Yorkers. Peter Carver Associates, New York, designed the rink.

New Amphibious Army Trucks Count on Aluminum

A "highly versatile" family of military trucks that can transport troops and cargo on the land or through the water has been developed for the Army by GMC Truck and Coach Division of General Motors Corp.

"These new floatable trucks represent a major advancement in troop and cargo transport," a GMC executive said. They bring together in one vehicle family entirely new engineering and design concepts. Among the innovations are V-6 diesel powerplants, all aluminum cabs and cargo bodies, and heavy-duty chassis components with interchangeability within the family. The cargo floor is extruded aluminum.

The 6x6, capable of hauling a 3½-ton payload, has driving traction in its four rear and two front wheels. The 8x8, a 5-ton carrier, has four driving wheels at the rear and four at the front.

Rubber sealed aluminum cabs and cargo bodies permit both vehicles to float over water as well as run cross-country on land. When afloat, the vehicles are propelled by the rotation of the wheels and are steered conventionally by front wheel positions. A propeller drive and rudder also are available by kit installation.

Special desert-tread tires give the vehicles a high degree of floatation over rough terrain and add to their buoyancy in water.

Fourteen men can be seated in the 6x6 and sixteen in the 8x8. Seats may be removed, giving an unobstructed cargo compartment. Cubic capacity to the top of the cargo body is approximately 180 cubic feet in the 6x6, and 205 cubic feet in the 8x8.

With its welded aluminum cab and cargo body, buoyancy is designed into each vehicle without resorting to the use of floatation materials that might interfere with body repairs or maintenance.

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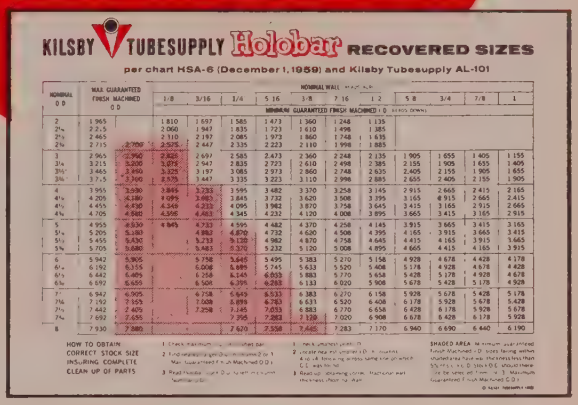

KILSBY TUBESUPPLY Holobar RECOVERED SIZES

per chart HSA-6 (December 1, 1959) and Kilsby Tubesupply AL-101

NOMINAL O.D.	MAX. GUARANTEED FINISH MACHINED O.D.	NOMINAL WALL — MINIMUM GUARANTEED FINISH MACHINED I.D. (BASIC DIMS.)									
		1/8	3/16	1/4	5/16	3/8	7/16	1/2	5/8	3/4	7/8	1
2	1.965	1.810	1.697	1.585	1.473	1.360	1.248	1.135				
2¼	2.215	2.060	1.947	1.835	1.723	1.610	1.498	1.385				
2½	2.465	2.310	2.197	2.085	1.973	1.860	1.748	1.635				
2¾	2.715	2.560	2.447	2.335	2.223	2.110	1.998	1.885				
3	2.965	2.810	2.697	2.585	2.473	2.360	2.248	2.135	1.905	1.655	1.405	1.155
3¼	3.215	3.060	2.947	2.835	2.723	2.610	2.498	2.385	2.155	1.905	1.655	1.405
3½	3.465	3.310	3.197	3.085	2.973	2.860	2.748	2.635	2.405	2.155	1.905	1.655
3¾	3.715	3.560	3.447	3.335	3.223	3.110	2.998	2.885	2.655	2.405	2.155	1.905
4	3.955	3.800	3.687	3.575	3.463	3.350	3.238	3.125	2.895	2.645	2.395	2.145
4¼	4.205	4.050	3.937	3.825	3.713	3.600	3.488	3.375	3.145	2.895	2.645	2.395
4½	4.455	4.300	4.187	4.075	3.963	3.850	3.738	3.625	3.395	3.145	2.895	2.645
4¾	4.705	4.550	4.437	4.325	4.213	4.100	3.988	3.875	3.645	3.395	3.145	2.895
5	4.955	4.800	4.687	4.575	4.463	4.350	4.238	4.125	3.895	3.645	3.395	3.145
5¼	5.205	5.050	4.937	4.825	4.713	4.600	4.488	4.375	4.145	3.895	3.645	3.395
5½	5.455	5.300	5.187	5.075	4.963	4.850	4.738	4.625	4.395	4.145	3.895	3.645
5¾	5.705	5.550	5.437	5.325	5.213	5.100	4.988	4.875	4.645	4.395	4.145	3.895
6	5.942	5.805	5.758	5.645	5.495	5.383	5.270	5.158	4.928	4.678	4.428	4.178
6¼	6.192	6.055	6.008	5.895	5.745	5.633	5.520	5.408	5.178	4.928	4.678	4.428
6½	6.442	6.305	6.258	6.145	6.003	5.883	5.770	5.658	5.428	5.178	4.928	4.678
6¾	6.692	6.555	6.508	6.395	6.253	6.133	6.020	5.908	5.678	5.428	5.178	4.928
7	6.942	6.905	6.758	6.645	6.503	6.383	6.270	6.158	5.928	5.678	5.428	5.178
7¼	7.192	7.155	7.008	6.895	6.753	6.633	6.520	6.408	6.178	5.928	5.678	5.428
7½	7.442	7.405	7.258	7.145	7.003	6.883	6.770	6.658	6.428	6.178	5.928	5.678
7¾	7.692	7.655		7.395	7.253	7.133	7.020	6.908	6.678	6.428	6.178	5.928
8	7.930	7.880		7.620	7.358	7.465	7.283	7.170	6.940	6.690	6.440	6.190

How many dollars go into your scrap pile when machining aluminum parts because *stock didn't clean up completely or because an unnecessary stock surplus was wasted in chips?*

Selecting the exact tubing O.D. and bore is easy now—without arithmetic, complicated formulae or chance for confusing slip-ups!

Just check your new Kilsby Tubesupply HOLOBAR Size Recovery Chart! It's *guaranteed* and takes out the guesswork...automatically compensates for out-of-roundness, concentricity deviations, etc.!

The Size Recovery Chart functions accurately every time *because of special tolerances inherent in Kilsby Tubesupply HOLOBAR.* It applies to both hard and soft HOLOBAR alloys—2024, 6061, 7075!

Ask For Your Free Copy—If you haven't already received a copy ask us for a HOLOBAR Size Recovery Chart. Tack it to your wall, use it in your workbook, or keep it in the handy file folder in your desk...you'll find the HOLOBAR Size Recovery Chart a *time-saver, work-saver, dollar saver!*

Don't Say We Didn't Warn You! Because Kilsby Tubesupply HOLOBAR tolerances are *different,* the Kilsby Tubesupply Size Recovery Chart is *guaranteed* to work *with this material only! Test it and see for yourself.*

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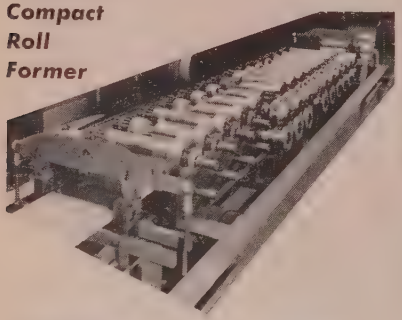

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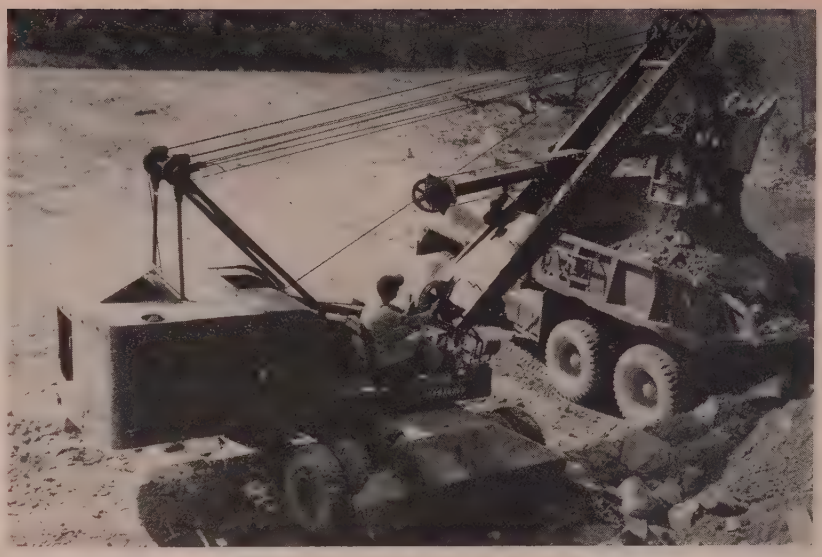


Aluminum Helps Hold Weight Line on Army Crane Shovel

The U. S. Army Engineers' 7-ton airborne, gasoline-engine-driven crane-shovel pictured consists of a full revolving superstructure, rubber-tired 4 x 4 drive, front wheel-steer carrier and a group of front-end attachments. The unit, equipped with a crane boom, hook block, and cable weighs 16,000 pounds and is capable of being air dropped.

Crane-shovel controls are the mechanical type although air is used to control the service brakes, swing lock, parking brakes, and retract mechanism. To accomplish a design weight of 16,000 pounds aluminum is used for cab, gear cases, outrigger beams, and outrigger floats.

As a crane, the unit is capable of lifting nine tons at a 10-foot operating radius when using outriggers. The unit is equipped with ⅜ cubic yard size shovel front, clamshell, and dragline.

The crane is equipped with a torque convertor and has a maximum speed of 8 mph on level ground and 1 mph on a 25% grade. Tires are 9:00 x 15, 12 ply size. A towing hitch is provided making it possible to tow the unit with a military 2½ ton 6 x 6 vehicle at speeds up to 35 mph.

Spray Coating Protects Aluminum From Weather

Aluminum trucks, trailers, airplanes, boats and other items that are usually kept outdoors can be protected with a spray coat of Collinite No. A 41 says Collinite Chemical Co., Utica 4, N. Y.

The spray protects against salt spray, fly ash, industrial plant exhaust, rain, sleet, etc., the firm says. The thin coating can be polished off by hand, leaving a wax film.

Collinite recommends spraying its coating on new windows, doors, etc. before installation to protect from plaster, mortar and lime. After installation, the coating can be polished off, leaving an undamaged, clean surface.

Harvey Signs Power Contract; Plans Rolling Mill

Harvey Aluminum and the Bonneville Power Administration announced the signing of a 20 year contract for electrical power for an aluminum reduction plant to be built in the Northwest. The agreement provides for 75,000 kilowatts of firm and 75,000 kilowatts of secondary power. The site is to be selected by July 1, 1961, and operations are scheduled for 1963.

Harvey Aluminum's board of directors authorized construction of the first phase of an aluminum sheet, plate, and strip mill. When completed, these added facilities will increase the company's mill products capacity to over 150,000 tons per year. The company's primary reduction facility is now producing at the rate of 60,000 tons per year.

Company management believes that the growth in consumption over the next ten years will average approximately 8% per annum; that new applications which did not heretofore use aluminum extensively virtually assure increased consumption.

Such markets are: Containers, special cans, metal boxes, truck floors and body structures, railroad cars, structures, automotive pistons, wheels, brakes, engine blocks, trim, mechanical housings, building structurals, interior walls and partitions, floor joists and spans, rigid conduit, bridge girders.

Two Finishing Treatments Developed for Magnesium

Two chemical treatments for magnesium alloys—a ferric nitrate bright pickle (Dow 21) and a chrome pickle (Dow 20)—have been developed by the Dow Metals Products Co., Div'n of the Dow Chemical Co., Midland, Mich.

Dow 21 provides a semi-bright to bright silvery finish on magnesium, Dow says. Good shelf life and reduced tarnishing are also claimed for the finish, which can be applied by either dipping or spraying. Clear baking enamels and lacquers can be applied over this finish to protect the surface.

Dow also says the ferric nitrate bright pickle is applicable to all forms of magnesium and can replace both Dow 15 for wrought alloys and Dow 16 for castings.

The new Dow 20, a modification of the standard Dow 1 chrome pickle, was developed for use on magnesium casting alloys with high aluminum content when a more uniform coating is desired.

Like Dow 1, it is designed to protect magnesium components during shipment and storage and can be used as a paint base. Besides providing a more uniform coating, Dow 20 is less prone to powdering than Dow 1, says the firm. Corrosion resistance and paint adhesion of the two treatments are similar.

Dow 20 coating can be caustic bleached to produce bright surfaces. Application of supplementary clear or tinted clear organic coatings will maintain these surfaces for long service periods, claims the firm.

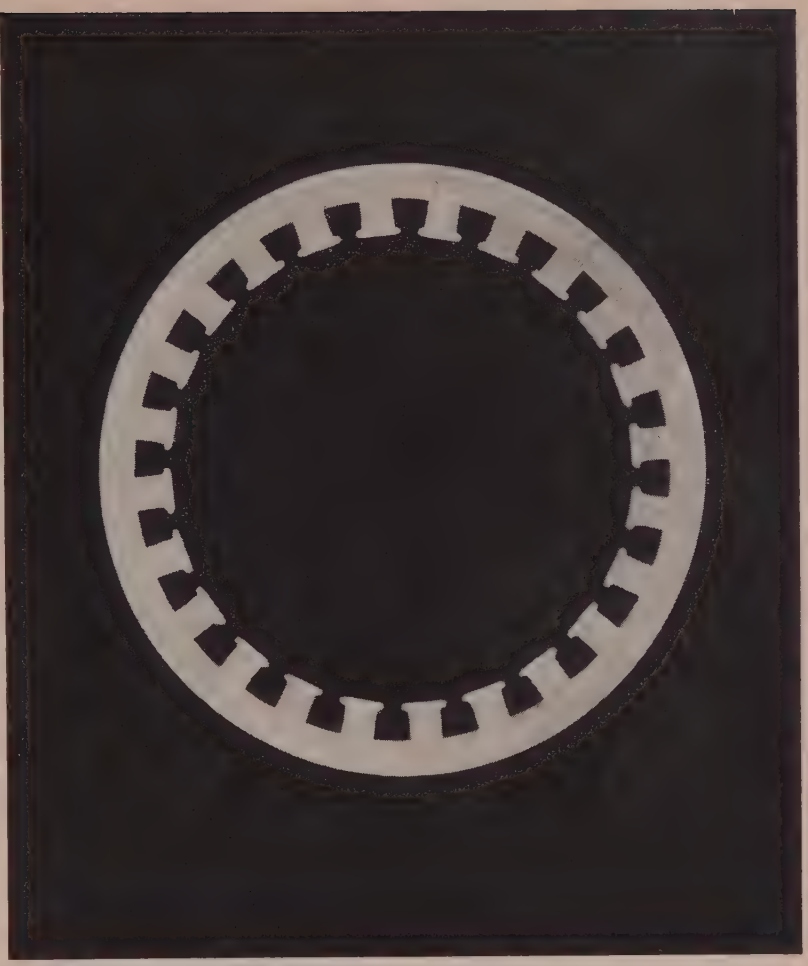
French Firms Testing New Production Process

New processes which, it is hoped, will produce aluminum at less than current costs are becoming numerous.

Latest project, under development for 10 years, was revealed by two French producers, Pechiney and Ugine. They said results obtained late last year led to their decision to construct a pilot plant, first part of which was on stream October 15. The rest will be operational by the end of 1960. Initial production will be 3000 to 5000 tons per year.

The firms have not disclosed any details of the new process, but say that it "differs not only from the conventional reduction process, but also from the new process being contemplated by (Aluminium Limited)."

Only other statement made by Pechiney and Ugine is that they anticipate a considerable reduction in production costs and a substantial reduction of the investment cost per ton capacity as compared to the Bayer method.



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Additional savings can be realized through lowered inventory of mill-width coils—less waiting for delivery of special slit widths. Also, customer satisfaction will increase as you achieve faster completion and delivery of finished products.

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Cast Aluminum Cylinder Rocker Arm Moving In on Iron

Newest example of the die casting art serving the automotive industry is the aluminum rocker arm, developed by Aluminum Co. of America to replace an iron counterpart. In predicting quick acceptance of the new aluminum casting, Alcoa reported that two major auto makers have already adopted the light metal unit, and two others are considering an early switch.

Two rocker arms are used per engine cylinder. They open and close intake and exhaust valves to a split-second beat—at turnpike speeds, about 20 times each second.

The "arrival" of the aluminum rocker arm comes 10 years after the last American car maker was won over from heavy cast-iron pistons to aluminum. Use of lightweight aluminum reduces the "reluctance" of any dynamic part where direction and speed must change many times a second.

James M. Smith, head of the engine section of Alcoa's Cleveland sales development division, says an approximate 1:2 weight advantage substantially reduces wear on the valve lifting mechanism.

"The rocker arm," says Mr. Smith, "during the life of the car, may move the valve more than 150 million times.

Such repeated stress must be taken into consideration in the design to prevent metal fatigue." (The arm is stressed as it lifts a valve, but drops back unstressed to the closed position.)

"Some engines, equipped with experimental aluminum components, have been driven at what amounts to an up-hill pull at full throttle for many days and nights," Mr. Smith reports. "Others are set to operate at alternating full throttle and 'city speeds' in tests which put a year's normal wear on an engine in less than a week."

Men-on-the-move

Frank L. Magee, president of Aluminum Co. of America, has been elected chairman of the board. He has been with Alcoa since 1917, after graduation from Lehigh University, and has devoted most of his career to the sales end of the business. **Lawrence Litchfield, Jr.** succeeds Magee as president. Litchfield, a graduate of the U. S. Naval Academy and Harvard University, became a geologist with Alcoa in 1925, and has been closely identified with management in Alcoa's exploration, raw materials and mining interests. **Irwin W. Wilson,** board chairman for the past three years, has been elected chairman of the newly formed finance committee.

Mackintosh-Hemphill Division of E. W. Bliss Co., Pittsburgh, Pa., has appointed **Edward P. Sandbach** manager of manufacturing. He had been chief metallurgist of Mack-Hemp since 1957, and came to the company from United Engineering & Foundry Co.

William D. Miller has been elected to the position of executive vice president of Consolidated Aluminum Corp., Jackson, Tenn. He has also been named a director, as has **Thomas W. Allison,** vice president, marketing-sales. **Louis C. Habegger,** vice president and general manager, will leave the U. S. in December for Zurich, Switzerland, to assume new duties on the executive staff of Conalco's parent company, Aluminium-Industrie-Aktien-Gesellschaft. Consolidated Aluminum, formerly Aluminum Foils, Inc., is a diversified producer of aluminum products, including sheet, foil, and high- and super-purity aluminum.

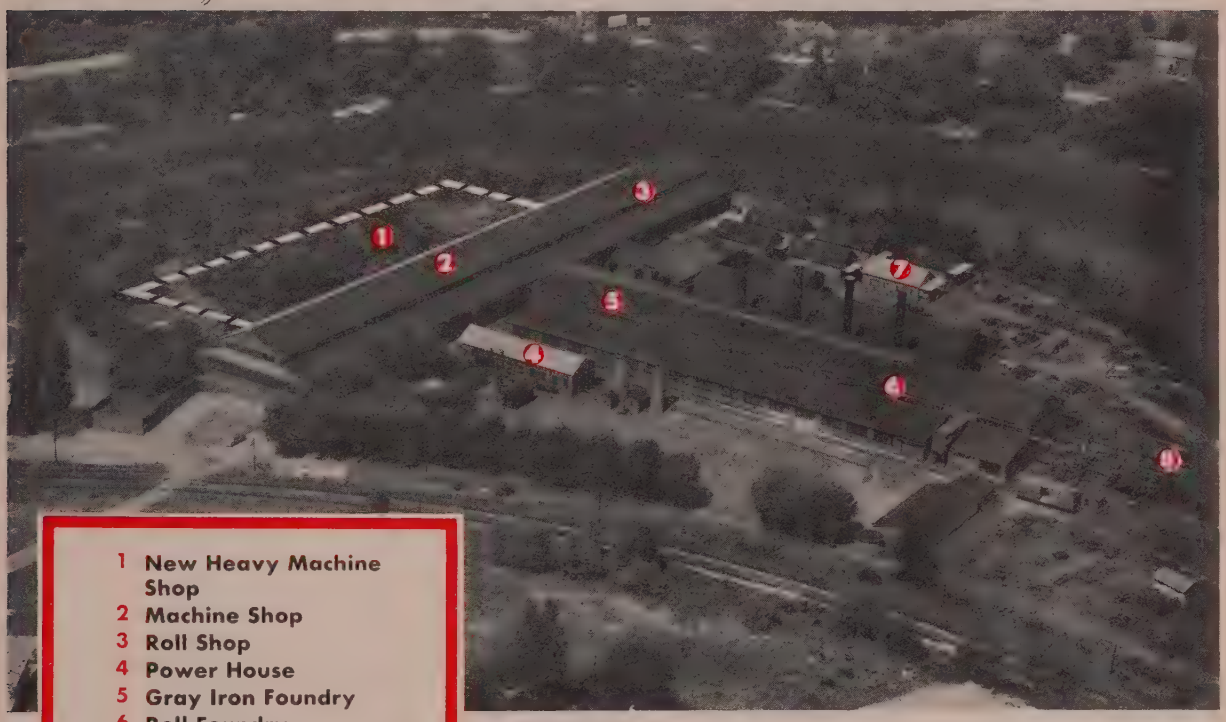
E. Howard Perkins, president and co-founder of Brooks & Perkins, Inc., Detroit manufacturer of light metal products, has retired. He will remain as chairman of the board. **Edward L. Ladd,** a former president of United Aircraft Products, Inc., Dayton, Ohio, has been elected to succeed Perkins. Ladd said he will strive to step up B&P's activity in the missile and electronic fields and a broadening and deepening of the product line.

Brooks & Perkins also named **Philip B. Craighead** manager of a newly formed Military Structures Division. He was founder and president of Magnesium Products Co., Milwaukee, Wis.

Hilliard Y. Smuck has been appointed chief executive officer and general manager of Quaker State Metals Co., Lancaster, Pa., a division of Howe Sound Co., New York. **Thomas M. Zimmerman** has been named executive vice president of this producer of aluminum sheet and coil.

Hyde Park

Adds Facilities for LARGER and HEAVIER STEEL MILL EQUIPMENT



1 New Heavy Machine Shop
2 Machine Shop
3 Roll Shop
4 Power House
5 Gray Iron Foundry
6 Roll Foundry
7 Pattern Storage
8 Scrap Yard

ROLLS

Nickel Alloy Grain Rolls
Grain Rolls
Chilled Rolls
Nickel Chilled Rolls
Moly Rolls
Nodular Iron Rolls

All Grades Nickel Alloy Iron Rolls for Hot and Cold Rolling

ROLLING MILL EQUIPMENT

Bar Mills
Merchant Mills
Roller Tables
Stretcher Levellers
Sheet Mill Shears
Special Machinery
Sheet and Strip Mills
Pinion Stands
Reduction Drives
Roll Lathes
Machine Work

CASTINGS

Furnace Castings
Heavy Die Castings
Bases
Housings
Machinery Castings
Slag Pots
Heavy Tool Castings
Floor Plates

A new Heavy Machine Shop Building with 27,000 square feet is being built to augment erection and heavy tool facilities.

The main bay will have a 60 foot center aisle with capacity for 75 Ton Cranes.

Now, with expanded erection and engineering facilities, Hyde Park welcomes the opportunity to work with you on any of your equipment requirements.

Hyde Park

RED CIRCLE Rolls ALLOY-CHILLED

The Mark of Quality

Foundry and Machine Company

HYDE PARK, WESTMORELAND COUNTY, PITTSBURGH DISTRICT, PA.

Where to buy... MATERIALS EQUIPMENT SERVICES for the Light Metals Industry

THIS BUYERS GUIDE IS PUBLISHED FOR THE USE OF PRODUCT MANUFACTURERS AND FABRICATORS WHO ARE SEEKING SUPPLIERS OF MATERIALS, EQUIPMENT AND SERVICES. THE FIRMS LISTED ARE ADVERTISERS IN MODERN METALS, AND CONSTITUTE ALL MAJOR SUPPLY SOURCES.

MATERIALS

ARCHITECTURAL SHAPES

Aluminum Co. of America
877 Alcoa Building
Pittsburgh 19, Pa.

Aluminum Extrusions Inc.
Charlotte, Mich.

Anaconda Aluminum Co.
P. O. Box 1654
Louisville 1, Ky.

The William L. Bonnell Co.
Newnan, Ga.

Bridegport Brass Company
30 Grand St.
Bridgeport 2, Connecticut

General Extrusions, Inc.
4040 Lake Park Road
Youngstown, Ohio

Harvey Aluminum
Torrance, Calif.

Kaiser Aluminum & Chemical Sales
Kaiser Center
Oakland 12, Calif.

North American Extrusions Corp.
5569 N. Riverview Drive
Kalamazoo, Mich.

Olin Aluminum
400 Park Avenue
New York 22, N. Y.

Revere Copper & Brass, Inc.
230 Park Ave.
New York 17, N. Y.

Reynolds Metals Company
6601 W. Broad St.
Richmond 18, Va.

Rogers Industries, Inc.
14575 Meyers Road
Detroit 27, Mich.

Saramar Aluminum Co.
4021 Mahoning Ave.
Youngstown, Ohio

Southern Extrusions Co.
North Washington Street
Magnolia, Arkansas

Wells Aluminum Corp.
North Liberty, Ind.

Wolverine Tube Div.
Calumet & Hecla, Inc.
17262 Southfield Rd.
Allen Park, Mich.

BAR AND ROD

Aluminium Limited Sales, Inc.
630 Fifth Avenue
New York 20, New York

Aluminum Co. of America
877 Alcoa Building
Pittsburgh 19, Pa. (Al)

Anaconda Aluminum Co.
P. O. Box 1654
Louisville 1, Ky.

William L. Bonnell Co., Inc.
Newnan, Ga.

Bridgeport Brass Company
30 Grand St.
Bridgeport 2, Connecticut

The Dow Metal Products Co.
Div'n, Dow Chemical Co.
Midland, Michigan (Al&Mg)

General Extrusions, Inc.
4040 Lake Park Road
Youngstown, Ohio (Al)

Harvey Aluminum
Torrance, Calif. (Al)

Kaiser Aluminum & Chemical Sales
Kaiser Center
Oakland 12, Calif.

Nichols Wire & Aluminum Co
Davenport, Iowa (Al)

North American Extrusions Corp.
5569 N. Riverview Drive
Kalamazoo, Mich.

Olin Aluminum
400 Park Avenue
New York 22, N. Y.

Revere Copper & Brass, Inc.
230 Park Ave.
New York 17, N. Y.

Reynolds Metals Company
6601 W. Broad St.
Richmond 18, Va.

Rogers Industries, Inc.
14575 Meyers Road
Detroit 27, Mich.

Saramar Aluminum Co.
4021 Mahoning Ave.
Youngstown, Ohio

Scovill Manufacturing Co.
99 Mill Street
Waterbury, Connecticut

Southern Extrusions Company
North Washington Street
Magnolia, Arkansas (Al)

Superior Industries, Inc.
3786 Oakwood Ave.
Youngstown, Ohio

Wells Aluminum Corp.
North Liberty, Ind.

Wolverine Tube Div.
Calumet & Hecla, Inc.
17262 Southfield Rd.
Allen Park, Mich.

BILLET, ALUMINUM

Aluminium Limited Sales, Inc
630 Fifth Avenue
New York 20, New York

Aluminum & Magnesium, Inc.
Sandusky, Ohio

Aluminum Co. of America
877 Alcoa Building
Pittsburgh 19, Pa.

Anaconda Aluminum Co.
P. O. Box 1654
Louisville 1, Ky.

Apex Smelting Company
2537 West Taylor Street
Chicago 12, Illinois

Corson Industries
Delair, N. J.

Harvey Aluminum
Torrance, Calif.

Kaiser Aluminum & Chemical Sales
Kaiser Center
Oakland 12, Calif.

Olin Aluminum
400 Park Ave.
New York 22, N. Y.

Revere Copper & Brass, Inc.
230 Park Ave.
New York 17, N. Y.

Reynolds Metals Company
6601 W. Broad St.
Richmond 18, Va.

Superior Industries, Inc.
3786 Oakwood Ave.
Youngstown, Ohio

Wolverine Tube Div.
Calumet & Hecla, Inc.
17262 Southfield Rd.
Allen Park, Mich.

BILLET, MAGNESIUM

The Dow Chemical Co.
Magnesium Department
Midland, Michigan

BRAZING SALTS, ALUMINUM

Heatbath Corp.
Springfield 1, Mass.

Park Chemical Co.
8074 Military Ave.
Detroit 4, Mich.

BUS CONDUCTOR, ALUMINUM

Aluminum Company of America
877 Alcoa Building
Pittsburgh 19, Pennsylvania

Anaconda Aluminum Co.
P. O. Box 1654
Louisville 1, Ky.

Bridgeport Brass Co.
30 Grand St.
Bridgeport 2, Conn.

Harvey Aluminum
Torrance, Calif.

Kaiser Aluminum & Chemical Sales
Kaiser Center
Oakland 12, Calif.

Olin Aluminum
400 Park Avenue
New York 22, N. Y.

Revere Copper & Brass, Inc.
230 Park Ave.
New York 17, N. Y.

Reynolds Metals Company
6601 W. Broad St.
Richmond 18, Va.

Rogers Industries, Inc.
14575 Meyers Road
Detroit 27, Mich.

Saramar Aluminum Co.
4021 Mahoning Ave.
Youngstown, Ohio

CASTINGS, ALUMINUM

Aluminum Company of America
877 Alcoa Building
Pittsburgh 19, Pa.

The Dow Metal Products Co.
Div'n Dow Chemical Co.
Midland, Mich.

Federal Die Casting Company
2226 North Elston
Chicago, Illinois

Southern Die Casting & Engineering
206 Albertson Rd.
High Point, N. C.

CASTINGS, MAGNESIUM

Aluminum Company of America
877 Alcoa Building
Pittsburgh 19, Pennsylvania

The Dow Metal Products Co.
Div'n, Dow Chemical Co.
Midland, Michigan

CIRCLES, ALUMINUM

Aluminum Co. of America
877 Alcoa Building
Pittsburgh 19, Pa.

Anaconda Aluminum Co.
P. O. Box 1654
Louisville 1, Ky.

Bridgeport Brass Co.
30 Grand St.
Bridgeport 2, Conn.

Fairmont Aluminum Co.
Fairmont, W. Va.

Kaiser Aluminum & Chemical Sales
Kaiser Center
Oakland 12, Calif.

Revere Copper & Brass, Inc.
230 Park Ave.
New York 17, N. Y.

Reynolds Metals Company
6601 W. Broad St.
Richmond 18, Va.

CLEANERS, ALUMINUM

Allied Research Products, Inc.
4004 East Monument St.
Baltimore 5, Md.

Amchem Products, Inc.
Ambler 12, Pa.

Diversey Corp.
1820 Roscoe St.
Chicago 13, Ill.

Frederick Gumm Chemical Co.
538 Forest St.
Kearny, New Jersey

Heatbath Corp.
Springfield 1, Mass.

The Hodson Corp.
5301-11 W. 66th St.
Chicago 38, Ill.

Neilson Chemical Co.
2318 Gainsboro
Detroit 20, Mich.

Northwest Chemical Co.
9310 Roselawn Ave.
Detroit 4, Mich.

Oakite Products, Inc.
50A Rector Street
New York 6, N. Y.

Parker Rust Proof Co.
2177 E. Milwaukee Ave.
Detroit 11, Mich.

Pennsalt Chemicals Corp.
Three Penn Center
Philadelphia 2, Pa.

COATINGS, ELECTRICALLY CONDUCTIVE

Amchem Products, Inc.
Ambler 12, Pa.

Grafo Colloids Corp.
Sharon, Pa.

Graphite Products Corp.
Brookfield, Ohio

COIL, ALUMINUM

Aluminum Company of America
877 Alcoa Building
Pittsburgh 19, Pa.

Aluminum Foils, Inc.
Jackson, Tenn.

Anaconda Aluminum Co.
P. O. Box 1654
Louisville 1, Ky.

Bridgeport Brass Co.
30 Grand St.

Fairmont Aluminum Company
Fairmont, West Virginia

Fromson Orban Co., Inc.
261 Madison Ave.
New York 16, N. Y.

Hunter Engineering Co.
1495 Columbia Ave.
Riverside, Calif.

Kaiser Aluminum & Chemical Sales
Kaiser Center
Oakland 12, Calif.

LaPointe Industries Inc.
Rockville, Conn.

Nichols Wire & Aluminum Co.
Davenport, Iowa

Olin Aluminum
400 Park Avenue
New York 22, N. Y.

Pfister Aluminum Corp.
50 West Allendale Ave.
Allendale, N. J.

Quaker State Metals Co.
Manheim Pike at 230 Bypass
Lancaster, Pa.

Revere Copper & Brass, Inc.
230 Park Ave.
New York 17, N. Y.

Reynolds Metals Company
6601 W. Broad St.
Richmond 18, Va.

Scovill Manufacturing Co.
99 Mill Street
Waterbury, Connecticut

COILS, PRE-ANODIZED

Coil Anodizers, Inc.
1250 Keating Ave.
Muskegon, Mich.

Fairmont Aluminum Co.
Fairmont, West Virginia

Fromson Orban Co., Inc.
261 Madison Ave.
New York 16, N. Y.

Quaker State Metals Co.
Manheim Pike at 230 Bypass
Lancaster, Pa.

COILS, PRE-PAINTED

Aluminum Co. of America
877 Alcoa Building
Pittsburgh 19, Pa.

Bridgeport Brass Co.
Aluminum Division
Bridgeport 2, Conn.

Enameled Steel & Sign Co.
4658 W. Addison St.
Chicago 41, Ill.

Fairmont Aluminum Co.
Fairmont, West Virginia

Litho-Strip Corp.
4800 S. Kilbourn Ave.
Chicago 32, Ill.

Pre Finish Metals Inc.
2110 E. Pratt Blvd.
Elk Grove, Ill.

Revere Copper & Brass, Inc.
230 Park Ave.
New York 17, N. Y.

Reynolds Aluminum Supply Co.
573 W. Peachtree Street, N.E.
Atlanta, Georgia

Reynolds Metals Company
6601 W. Broad St.
Richmond 18, Va.

Zegers, Inc.
8090 So. Chicago Ave.
Chicago 17, Ill.

COMPOUNDS, BARREL FINISHING

Allied Research Products, Inc.
4004 East Monument St.
Baltimore 5, Md.

Oakite Products, Inc.
50A Rector St.
New York 6, New York

Pennsalt Chemicals Corp.
Three Penn Center
Philadelphia 2, Pa.

CONVERSION COATING, ALUMINUM

Allied Research Products, Inc.
4004 E. Monument St.
Baltimore 5, Md.

Amchem Products, Inc.
Ambler 12, Pa.

Frederick Gumm Chemical Co., Inc.
538 Forest St.
Kearny, N. J.

Heatbath Corp.
Springfield 1, Mass.

Neilson Chemical Co.
2318 Gainsboro
Detroit 20, Mich.

Northwest Chemical Co.
9310 Roselawn Ave.
Detroit 4, Mich.

Parker Rust Proof Co.
2177 E. Milwaukee Ave.
Detroit 11, Mich.

Pennsalt Chemicals Corp.
Philadelphia 2, Pa.

DIE STEELS FOR DIE CASTING

Ajax Steel & Forge Co.
205 Adair St.
Detroit 7, Mich.

Latrobe Steel Co.
Latrobe, Pa.

U.N. Alloy Steel Co.
365 Dorchester Ave.
Boston 27, Mass.

DIE STEEL, EXTRUSION

Ajax Steel & Forge Co.
205 Adair St.
Detroit 7, Mich.

Latrobe Steel Co.
Latrobe, Pa.

U.N. Alloy Steel Co.
365 Dorchester Ave.
Boston 27, Mass.

DISPERSIONS, COLLOIDAL-GRAPHITE

Grafo Colloids Co.
259 Wilkes Pl.
Sharon, Pa.

Graphite Products Corp.
Brookfield, Ohio

DRAWING COMPOUNDS, METAL AND WIRE

Grafo Colloids Corp.
Sharon, Pa.

Graphite Products Corp.
Brookfield, Ohio

L. R. Kerns Co.
2657 E. 95th St.
Chicago, Ill.

Northwest Chemical Co.
9310 Roselawn Ave.
Detroit 4, Mich.

DYES, ANODIZING

Carbic-Hoechst Corp.
451 Washington St.
New York 13, N. Y.

Koppers, Inc.
Chemicals & Dyestuffs Div.
Porter Building
Pittsburgh 19, Pa.

ELECTRODES FOR WELDING

All-State Welding Alloys Co., Inc.
249-55 Ferris Avenue
White Plains, New York

ENAMELS, PORCELAIN ALUMINUM

Ferro Corporation
4150 E. 56th St.
Cleveland 5, Ohio

ETCHANT, ALUMINUM

Allied Research Products, Inc.
4004 East Monument St.
Baltimore 5, Md.

Amchem Products, Inc.
Ambler 12, Pa.

Frederick Gumm Chemical Co.
538 Forest St.
Kearny, N. J.

Heatbath Corp.
Springfield 1, Mass.

Neilson Chemical Co.
2318 Gainsboro
Detroit 20, Mich.

Northwest Chemical Co.
9310 Roselawn Ave.
Detroit 4, Mich.

Oakite Products, Inc.
50A Rector St.
New York 6, N. Y.

Parker Rust Proof Co.
2177 E. Milwaukee Ave.
Detroit 11, Mich.

Pennsalt Chemicals Corp.
Three Penn Center
Philadelphia 2, Pa.

EXTRUSIONS, ALUMINUM

Aluminum Co. of America
877 Alcoa Building
Pittsburgh 19, Pa.

Aluminum Extrusions Inc.
Charlotte, Mich.

Anaconda Aluminum Co.
P. O. Box 1654
Louisville 1, Ky.

Benson Aluminum Co., Inc.
621 Virginia St.
Connersville, Ind.

William L. Bonnell Co., Inc.
Newnan, Ga.

Bridgeport Brass Company
30 Grand St.
Bridgeport 2, Conn.

The Dow Metal Products Co.
Div'n, Dow Chemical Co.
Midland, Mich.

General Extrusions, Inc.
4040 Lake Park Road
Youngstown, Ohio

Harvey Aluminum
Torrance, Calif.

Kaiser Aluminum & Chemical Sales
Kaiser Center
Oakland 12, Calif.

Midwest Aluminum Corp.
7696 W. Michigan Ave.
Kalamazoo, Mich.

North American Extrusions Corp.
5569 N. Riverview Drive
Kalamazoo, Mich.

Olin Aluminum
400 Park Avenue
New York 22, New York

Pfister Aluminum Corp.
50 West Allendale Ave.
Allendale, N. J.

Revere Copper & Brass, Inc.
230 Park Ave.
New York 17, N. Y.

Reynolds Metals Company
6601 W. Broad St.
Richmond 18, Va.

Rogers Industries, Inc.
14757 Meyers Road
Detroit 27, Mich.

Saramar Aluminum Co.
4021 Mahoning Ave.
Youngstown, Ohio

Southern Extrusions Co.
North Washington Street
Magnolia, Arkansas

Superior Industries, Inc.
3786 Oakwood Ave.
Youngstown, Ohio

Wells Aluminum Corp.
North Liberty, Ind.

Wolverine Tube Div.
Calumet & Hecla, Inc.
17262 Southfield Rd.
Allen Park, Mich.

EXTRUSIONS, IMPACT

Aluminum Company of America
877 Alcoa Building
Pittsburgh 19, Pa. (Al)

Bridgeport Brass Company
30 Grand St.
Bridgeport 2, Connecticut

Harvey Aluminum
Torrance, Calif

EXTRUSIONS, IMPACT, ZIRCONIUM

Harvey Aluminum
Torrance, Calif.

EXTRUSIONS, MAGNESIUM

Aluminum Company of America
877 Alcoa Building
Pittsburgh 19, Pennsylvania

The Dow Metal Products Co.
Div'n, Dow Chemical Co.
Midland, Michigan

EXTRUSIONS, TITANIUM

Bridgeport Brass Company
Aluminum Division
Bridgeport 2, Connecticut

Harvey Aluminum
Torrance, Calif.

EXTRUSIONS, ZIRCONIUM

Harvey Aluminum
Torrance, Calif.

FASTENERS, ALUMINUM

Aluminum Co. of America
877 Alcoa Building
Pittsburg 19, Pa.

Southern Screw Company
Statesville, North Carolina

FENCING, ALUMINUM

Nichols Wire & Aluminum Co.
Davenport, Iowa

FILLER METAL, ALUMINUM

All-State Welding Alloys Co.
249-55 Ferris Avenue
White Plains, New York

FILLER METAL, MAGNESIUM

All-State Welding Alloys
249-55 Ferris Ave.
White Plains, N. Y.

FINISHES AND COATINGS, ALUMINUM

Allied Research Products, Inc.
4004 East Monument St.
Baltimore 5, Md.

Amchem Products, Inc.
Ambler 12, Pennsylvania

De Soto Chemical Coatings, Inc.
1350 S. Kostner Ave.
Chicago 23, Ill.

Diversey Corp.
1820 Roscoe St.
Chicago 13, Ill.

Eastman Chemical Products, Inc.
Kingsport, Tennessee

Frederick Gumm Chemical Co.
538 Forest St.
Kearny, N. J.

Heatbath Corp.
Springfield 1, Mass.

Neilson Chemical Co.
2318 Gainsboro
Detroit 20, Mich.

Northwest Chemical Co.
9310 Roselawn Ave.
Detroit 4, Mich.

Oakite Products, Inc.
50A Rector St.
New York 6, New York

Parker Rust Proof Co.
2177 E. Milwaukee Ave.
Detroit 11, Mich.

Pennsalt Chemicals Corp.
Three Penn Center
Philadelphia 2, Pa.

Sherwin-Williams Co.
Cleveland 1, Ohio

FLUXES, ALUMINUM

All-State Welding Alloys Co., Inc.
249-55 Ferris Avenue
White Plains, New York

Aluminum Co. of America
877 Alcoa Building
Pittsburgh 19, Pa.

Apex Smelting Company
2537 West Taylor Street
Chicago 12, Illinois

Federated Metals Div.
American Smelting & Refining Corp.
120 Broadway
New York 5, N. Y.

Kaiser Aluminum & Chemical Sales
Kaiser Center
Oakland 12, Calif.

Reynolds Metals Company
6601 W. Broad St.
Richmond 18, Va.

FLUX, ALUMINUM SOLDERING

All-State Welding Alloys Co., Inc.
249-55 Ferris Avenue
White Plains, New York

FLUX, BRAZING

All-State Welding Alloys Co., Inc.
249-55 Ferris Ave.
White Plains, N. Y.

FLUX, WELDING

All-State Welding Alloys Co. Inc.
249-55 Ferris Ave.
White Plains, N. Y.

FLUXES, MAGNESIUM

All-State Welding Alloys Co., Inc.
249-55 Ferris Avenue
White Plains, New York

FOIL, ALUMINUM

Aluminum Co. of America
877 Alcoa Building
Pittsburgh 19, Pa.

Anaconda Aluminum Co.
P.O. Box 1654
Louisville 1, Ky.

Consolidated Aluminum Corp.
Jackson, Tenn.

Kaiser Aluminum & Chemical Sales
Kaiser Center
Oakland 12, Calif.

Revere Copper & Brass, Inc.
230 Park Ave.
New York 17, N. Y.

Reynolds Metals Company
6601 West Broad St.
Richmond 18, Va.

FOIL, ALUMINUM, PREANODIZED

Coil Anodizers, Inc.
1250 Keating Ave.
Muskegon, Mich.

Fromson Orban Co., Inc.
261 Madison Ave.
New York 16, N. Y.

FORGINGS, ALUMINUM

Aluminium Limited Sales, Inc.
630 Fifth Avenue
New York 20, New York

Aluminum Co. of America
877 Alcoa Building
Pittsburgh 19, Pa. (Al)

Bridgeport Brass Company
30 Grand St.
Bridgeport 2, Conn. (Al, Ti)

Harvey Aluminum
Torrance, Calif.

Kaiser Aluminum & Chemical Sales
Kaiser Center
Oakland 12, Calif.

Revere Copper & Brass, Inc.
230 Park Ave.
New York 17, N. Y.

Scovill Manufacturing Co.
99 Mill St.
Waterbury, Conn.

Wyman-Gordon Company
Worcester 1, Mass. (Al, Mg, Ti)

FORGINGS, COLD, NO-DRAFT

Aluminum Company of America
877 Alcoa Building
Pittsburgh 19, Pennsylvania

Bridgeport Brass Company
30 Grand St.
Bridgeport 2, Connecticut

Harvey Aluminum
Torrance, Calif.

Kaiser Aluminum & Chemical Sales
Kaiser Center
Oakland 12, Calif.

FORGINGS, EXTRUSION, TOOL

Ajax Steel & Forge Co.
205 Adair St.
Detroit 7, Mich.

Latrobe Steel Co.
Latrobe, Pa.

FORGINGS, IMPACT

Aluminum Company of America
877 Alcoa Building
Pittsburgh 19, Pa.

Bridgeport Brass Co.
30 Grand St.
Bridgeport 2, Conn.

Harvey Aluminum
Torrance, Calif.

FORGINGS, MAGNESIUM

Aluminum Company of America
877 Alcoa Building
Pittsburgh 19, Pennsylvania

Bridgeport Brass Co.
Aluminum Division
Bridgeport 2, Conn.

Harvey Aluminum
Torrance, Calif.

Wyman-Gordon Company
Worcester 1, Mass.

FRIT FOR ALUMINUM

Ferro Corp.
4150 E. 56th St.
Cleveland 5, Ohio

HARDWARE, DOOR, WINDOW

Cipco Corporation
22nd & Cole Streets
St. Louis 6, Mo.

HEAT TREATING SALTS, ALUMINUM

Heatbath Corp.
Springfield 1, Mass.

HIGH PURITY ALUMINUM

Aluminum Co. of America
877 Alcoa Building
Pittsburgh 19, Pa.

Consolidated Aluminum Corp.
Jackson, Tenn.

Kaiser Aluminum & Chemical Corp.
Kaiser Center
Oakland 12, Calif.

INGOT, ALUMINUM (ALLOYS)

Aluminium Limited Sales, Inc.
630 Fifth Avenue
New York 20, New York

Aluminum & Magnesium, Inc.
Sandusky, Ohio

Aluminum Co. of America
877 Alcoa Building
Pittsburgh 19, Pa.

Aluminum Transatlantic, Inc.
30 Rockefeller Plaza
New York 20, N. Y.

Anaconda Aluminum Co.
P. O. Box 1654
Louisville 1, Ky.

Apex Smelting Company
2537 West Taylor Street
Chicago 12, Illinois

Federated Metals Div. ASARCO
120 Broadway
New York 5, N. Y.

Harvey Aluminum
Torrance, Calif.

Kaiser Aluminum & Chemical Sales
Kaiser Center
Oakland 12, Calif.

Olin Aluminum
400 Park Ave.
New York 22, N. Y.

Revere Copper & Brass, Inc.
230 Park Ave.
New York 17, N. Y.

Reynolds Metals Company
6601 W. Broad St.
Richmond 18, Va.

INGOT, MAGNESIUM (ALLOYS)

Apex Smelting Company
2537 West Taylor Street
Chicago 12, Illinois

The Dow Chemical Co.
Magnesium Department
Midland, Michigan

INGOT, ZIRCONIUM

Harvey Aluminum
Torrance, Calif.

IRRIGATION PIPE, ALUMINUM

Aluminum Co. of America
877 Alcoa Building
Pittsburgh 19, Pa.

Fromson Orban Co., Inc.
261 Madison Ave.
New York 16, N. Y.

General Extrusions, Inc.
4040 Lake Park Road
Youngstown, Ohio

Harvey Aluminum
Torrance, Calif.

Kaiser Aluminum & Chemical Sales
Kaiser Center
Oakland 12, Calif.

Olin Aluminum
400 Park Ave.
New York 22, N. Y.

Reynolds Metals Company
6601 W. Broad St.
Richmond 18, Va.

LUBRICANTS, EXTRUDING & CASTING

Acheson Colloids Co.
Div. Acheson Industries, Inc.
Port Huron, Mich.

Grafo Colloids Corp.
259 Wilkes Place
Sharon, Pa.

Graphite Products Corp.
Brookfield, Ohio

The Hodson Corp.
5301-11 W. 66th St.
Chicago 38, Ill.

L. R. Kerns Co.
2657 E. 95th St.
Chicago, Ill.

Scott Chemical Corp.
510 W. Garfield
Glendale 4, Calif.

LUBRICANTS, METALWORKING

Acheson Colloids Co.
Div. Acheson Industries, Inc.
Port Huron, Mich.

Grafo Colloids Corp.
259 Wilkes Place
Sharon, Pa.

Graphite Products Corp.
Brookfield, Ohio

The Hodson Corp.
5301-11 W. 66th St.
Chicago 38, Ill.

L. R. Kerns Co.
2657 E. 95th St.
Chicago, Ill.

Oakite Products, Inc.
50A Rector St.
New York 6, New York

Parker Rust Proof Co.
2177 E. Milwaukee Ave.
Detroit 11, Mich.

Pennsalt Chemicals Corp.
Three Penn Center
Philadelphia 2, Pa.

Scott Chemical Corp.
510 W. Garfield
Glendale 4, Calif.

MAINTENANCE MATERIALS, PAINT SPRAY BOOTH

Oakite Products, Inc.
50A Rector St.
New York 6, N. Y.

Pennsalt Chemicals Corp.
Three Penn Center
Philadelphia 2, Pa.

NAILS, ALUMINUM

Aluminum Co. of America
877 Alcoa Building
Pittsburgh 19, Pa.

Nichols Wire & Aluminum Co.
Davenport, Iowa

Quaker State Metals Co.
Manheim Pike at 230 Bypass
Lancaster, Pa.

Reynolds Metals Company
6601 W. Broad St.
Richmond 18, Va.

NUTS

Aluminum Co. of America
877 Alcoa Building
Pittsburgh 19, Pa.

PARTING COMPOUNDS

Grafo Colloids Corp.
Sharon, Pa.

Graphite Products Corp.
Brookfield, Ohio

PIPE, ALUMINUM

Aluminum Co. of America
877 Alcoa Building
Pittsburgh 19, Pa. (Al)

Anaconda Aluminum Co.
P. O. Box 1654
Louisville 1, Ky.

Bridgeport Brass Company
30 Grand St.
Bridgeport 2, Connecticut

The Dow Metal Products Co.
Div'n, Dow Chemical Co.
Midland, Michigan

Harvey Aluminum
Torrance, Calif.

Kaiser Aluminum & Chemical Sales
Kaiser Center
Oakland 12, Calif.

North American Extrusions Corp.
5569 N. Riverview Drive
Kalamazoo, Mich.

Olin Aluminum
400 Park Ave.
New York 22, N. Y.

Quaker State Metals Co.
Manheim Pike at 230 Bypass
Lancaster, Pa.

Revere Copper & Brass, Inc.
230 Park Ave.
New York 17, N. Y.

Reynolds Metals Company
6601 W. Broad St.
Richmond 18, Va.

Rogers Industries, Inc.
14575 Meyers Road
Detroit 27, Mich.

Saramar Aluminum Co.
4021 Mahoning Ave.
Youngstown, Ohio

Wells Aluminum Corp.
North Liberty, Ind.

Wolverine Tube Div.
Calumet & Hecla, Inc.
17262 Southfield Rd.
Allen Park, Mich.

PLASTIC CAPS, INSERTS

Impex Corp.
4049 Simon Road
Youngstown 12, Ohio

PLASTIC, RAW MATERIALS

Union Carbide Plastics Div'n
270 Park Ave.
New York 17, N. Y.

PLASTIC, RESIN

Union Carbide Plastics Div'n
270 Park Ave.
New York 17, N. Y.

PLATE, ALUMINUM

Aluminum Co. of America
877 Alcoa Building
Pittsburgh 19, Pa.

Anaconda Aluminum Co.
P. O. Box 1654
Louisville 1, Ky.

Fairmont Aluminum Company
Fairmont, West Virginia

Kaiser Aluminum & Chemical Sales
Kaiser Center
Oakland 12, Calif.

Nichols Wire & Aluminum Co.
Rockingham Road
Davenport, Iowa

Olin Aluminum
400 Park Avenue
New York 22, New York

Reynolds Metals Company
6601 W. Broad St.
Richmond 18, Va.

Sheet Aluminum Corp.
701 Liberty St.
Jackson, Mich.

PLATE, MAGNESIUM

Brooks & Perkins, Inc.
1950 W. Fort St.
Detroit 16, Mich.

The Dow Metal Products Co.
Div'n, Dow Chemical Co.
Midland, Michigan

PLATE, ZIRCONIUM

Harvey Aluminum
Torrance, Calif.

POLISHING, BUFFING COMPOUNDS

Frederick Gumm Chemical Co., Inc.
538 Forest St.
Kearny, N. J.

POLISHING, CHEMICAL

Alchemize Corporation
1431 South Talman Avenue
Chicago 8, Illinois

Allied Research Products, Inc.
4004 East Monument St.
Baltimore 5, Md.

Frederick Gumm Chemical Co., Inc.
538 Forest St.
Kearny, N. J.

Heatbath Corp.
Springfield 1, Mass.

REFRACTORY PRODUCTS

Babcock & Wilcox Corp.
Refractories Div.
161 E. 42nd Street
New York 17, N. Y.

Harbison-Walker Refractories Co.
Farmers Bank Building
Pittsburgh 22, Pa.

Kaiser Aluminum & Chemical Sales
Kaiser Center
Oakland 12, Calif.

H. K. Porter Co., Inc.
Porter Bldg.
Pittsburgh 19, Pa.

Refractory Products Co.
910 Custer Ave.
Evanston, Ill.

RIVETS, ALUMINUM

Aluminum Co. of America
877 Alcoa Building
Pittsburgh 19, Pa.

ROD AND BAR, ZIRCONIUM

Harvey Aluminum
Torrance, Calif.

ROD, BRAZING

All-State Welding Alloys Co.
249-55 Ferris Avenue
White Plains, New York

Aluminum Company of America
877 Alcoa Building
Pittsburgh 19, Pennsylvania

Nichols Wire & Aluminum Co.
Davenport, Iowa

ROD, WELDING

All-State Welding Alloys Co.
249-55 Ferris Avenue
White Plains, New York

Aluminum Company of America
877 Alcoa Buildings
Pittsburgh 19, Pennsylvania

The Dow Metal Products Co.
Div'n, Dow Chemical Co.
Midland, Mich.

Kaiser Aluminum & Chemical Sales
Kaiser Center
Oakland 12, Calif.

Nichols Wire & Aluminum Co.
Davenport, Iowa

Reynolds Metals Company
6601 W. Broad St.
Richmond 18, Va.

SCREEN WIRE, ALUMINUM

Aluminum Company of America
877 Alcoa Building
Pittsburgh 19, Pennsylvania

Kaiser Aluminum & Chemical Sales
Kaiser Center
Oakland 12, Calif.

SCREEN WIRE, ALUMINUM, ANODIZED

Fromson Orban Co., Inc.
261 Madison Ave.
New York 16, N. Y.

SCREWS, MACHINE, ALUMINUM

Aluminum Co. of America
877 Alcoa Building
Pittsburgh 19, Pennsylvania

Southern Screw Company
Statesville, North Carolina

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Pittsburgh 19, Pa.

Reynolds Metals Company
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Richmond 18, Va.

Southern Screw Company
Statesville, North Carolina

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Aluminum Finishing Corp.
1012 E. 21st Street
Indianapolis, Indiana

SHAPES, ROLL FORMED

Allmetal Weatherstrip Co.
1911 Ridge Ave.
Evanston, Ill.

Nichols Wire & Aluminum Company
Davenport, Iowa

Quaker State Metals Co.
Manheim Pike at 230 Bypass
Lancaster, Pennsylvania

Pfister Aluminum Corp.
50 West Allendale Ave.
Allendale, N. J.

Revere Copper & Brass, Inc.
230 Park Ave.
New York 17, N. Y.

Reynolds Metals Company
6601 W. Broad St.
Richmond 18, Va.

Rogers Industries, Inc.
14575 Meyers Road
Detroit 27, Mich.

SHEET, ALUMINUM

Aluminum Co. of America
877 Alcoa Building
Pittsburgh 19, Pa.

Anaconda Aluminum Co.
P. O. Box 1654
Louisville 1, Ky.

Bridgeport Brass Company
30 Grand St.
Bridgeport 2, Conn.

Consolidated Aluminum Corp.
Jackson, Tenn.

Fairmont Aluminum Company
Fairmont, West Virginia

Hunter Engineering Co.
1495 Columbia Ave.
Riverside, Calif.

Kaiser Aluminum & Chemical Sales
Kaiser Center
Oakland 12, Calif.

Nichols Wire & Aluminum Co.
Davenport, Iowa

Olin Aluminum
400 Park Avenue
New York 22, New York

Quaker State Metals Co.
Manheim Pike at 230 Bypass
Lancaster, Pa.

Revere Copper & Brass, Inc.
230 Park Ave.
New York 17, N. Y.

Reynolds Metals Company
6601 W. Broad St.
Richmond 18, Va.

Scovill Manufacturing Co.
99 Mill Street
Waterbury, Conn.

SHEET, ANODIZED

Aluminum Company of America
877 Alcoa Building
Pittsburgh 19, Pennsylvania

Aluminum Finishing Corp.
1012 E. 21st Street
Indianapolis, Indiana

City Plating & Polishing Co.
22nd & Cole Street
St. Louis 6, Missouri

Coil Anodizers, Inc.
1250 Keating Ave.
Muskegon, Mich.

Fairmont Aluminum Co.
Fairmont, West Virginia

Fromson Orban Co., Inc.
261 Madison Ave.
New York 16, N. Y.

Quaker State Metals Co.
Manheim Pike at 230 Bypass
Lancaster, Pennsylvania

Reynolds Metals Company
6601 W. Broad St.
Richmond 18, Va.

Southern Extrusions, Inc.
North Washington Street
Magnolia, Arkansas

SHEET, MAGNESIUM

Brooks & Perkins, Inc.
1950 W. Fort St.
Detroit 16, Mich.

The Dow Metal Products Co.
Div'n, Dow Chemical Co.
Midland, Mich.

SHEET, ZIRCONIUM

Harvey Aluminum
Torrance, Calif.

SOLDER, ALUMINUM

All-State Welding Alloys Co.
249-55 Ferris Avenue
White Plains, New York

Aluminum Company of America
877 Alcoa Building
Pittsburgh 19, Pa.

SPOOLED ALUMINUM

All-State Welding Alloys Co., Inc.
249-55 Ferris Ave.
White Plains, N. Y.

STRIPPERS, METAL & PAINT

Allied Research Products, Inc.
4004 East Monument St.
Baltimore 5, Md.

Frederick Gumm Chemical Co., Inc.
538 Forest St.
Kearny, N. J.

Heatbath Corp.
Springfield 1, Mass.

Northwest Chemical Co.
9310 Roselawn Ave.
Detroit 4, Mich.

Oakite Products, Inc.
50A Rector St.
New York 6, N. Y.

STRUCTURALS, ALUMINUM

Aluminum Company of America
877 Alcoa Building
Pittsburgh 19, Pennsylvania

Aluminum Extrusions Inc.
Charlotte, Mich.

Anaconda Aluminum Co.
P. O. Box 1654
Louisville 1, Ky.

Willam L. Bonnell Co., Inc.
Newnan, Ga.

Bridgeport Brass Co.
30 Grand St.
Bridgeport 2, Conn.

Corson Industries
Delair, N. J.

The Dow Metal Products Co.
Div'n, Dow Chemical Co.
Midland, Mich.

General Extrusions, Inc.
4040 Lake Park Road
Youngstown, Ohio

Harvey Aluminum
Torrance, Calif.

Kaiser Aluminum & Chemical Sales
Kaiser Center
Oakland 12, Calif.

North American Extrusions Corp.
5569 N. Riverview Drive
Kalamazoo, Mich.

Revere Copper & Brass, Inc.
230 Park Ave.
New York 17, N. Y.

Reynolds Metals Company
6601 W. Broad St.
Richmond 18, Va.

Rogers Industries, Inc.
14575 Meyers Road
Detroit 27, Mich.

Southern Extrusions, Inc.
North Washington St.
Magnolia, Arkansas

SUPER-PURITY ALUMINUM

Consolidated Aluminum Corp.
Jackson, Tenn.

TOOLING PLATE, ALUMINUM

Reynolds Metals Co.
6601 W. Broad St.
Richmond 18, Va.

TREAD PLATE, MAGNESIUM

The Dow Metal Products Co.
Div'n, Dow Chemical Co.
Midland, Mich.

TUBED SHEET, ALUMINUM

Aluminum Co. of America
877 Alcoa Building
Pittsburgh 19, Pa.

Olin Roll-Bond Division
East Alton, Ill.

Revere Copper & Brass, Inc.
230 Park Ave.
New York 17, N. Y.

Reynolds Metals Co.
6601 W. Broad St.
Richmond 18, Va.

TUBE, ALUMINUM

Aluminium Limited Sales, Inc.
630 Fifth Avenue
New York 20, New York

Aluminum Co. of America
877 Alcoa Building
Pittsburgh 19, Pa.

Aluminum Extrusions Inc.
Charlotte, Mich.

Anaconda Aluminum Co.
P. O. Box 1654
Louisville 1, Ky.

William L. Bonnell Co., Inc.
Newnan, Ga.

Bridgeport Brass Company
30 Grand St.
Bridgeport 2, Conn.

Corson Industries
Delair, N. J.

The Dow Metal Products Co.
Div'n, Dow Chemical Co.
Midland, Mich.

Fromson Orban Co., Inc.
261 Madison Ave.
New York 16, N. Y.

General Extrusions, Inc.
4040 Lake Park Road
Youngstown, Ohio

Harvey Aluminum
Torrance, Calif.

Kaiser Aluminum & Chemical Sales
Kaiser Center
Oakland 12, Calif.

LaPointe Industries Inc.
Rockville, Conn.

Olin Aluminum
400 Park Avenue
New York 22, New York

Pfister Aluminum Corp.
50 West Allendale Ave.
Allendale, N. J.

Quaker State Metals Co.
Manheim Pike at 230 Bypass
Lancaster, Pennsylvania

Revere Copper & Brass, Inc.
230 Park Ave.
New York 17, N. Y.

Reynolds Metals Company
6601 W. Broad St.
Richmond 18, Va.

Rogers Industries, Inc.
14572 Meyers Road
Detroit 27, Mich.

Saramar Aluminum Co.
4021 Mahoning Ave.
Youngstown, Ohio

Southern Extrusions Company
North Washington Street
Magnolia, Arkansas

Wells Aluminum Corp.
North Liberty, Ind.

Wolverine Tube Div.
Calumet & Hecla, Inc.
17262 Southfield Rd.
Allen Park, Mich.

TUBE, MAGNESIUM

Aluminum Co. of America
877 Alcoa Building
Pittsburgh 19, Pa.

The Dow Metal Products Co.
Div. Dow Chemical Co.
Midland, Mich.

TUBE, ZIRCONIUM

Harvey Aluminum
Torrance, Calif.

Wolverine Tube
Div. Calumet & Hecla Inc.
17200 Southfield Rd.
Allen Park, Mich.

VENETIAN BLIND STOCK

Bridgeport Brass Co.
30 Grand St.
Bridgeport 2, Conn.

Reynolds Metals Company
6601 W. Broad St.
Richmond 18, Va.

WIRE, ALUMINUM

All-State Welding Alloys Co.
249-55 Ferris Avenue
White Plains, New York

Aluminium Limited Sales, Inc.
630 Fifth Avenue
New York 20, New York

Aluminum Co. of America
877 Alcoa Building
Pittsburgh 19, Pa.

Nichols Wire & Aluminum Co.
Davenport, Iowa

Reynolds Metals Company
6601 W. Broad St.
Richmond 18, Va.

WIRE, PRECISION SPOOLED, ALUMINUM

All-State Welding Alloys Co.
249-55 Ferris Ave.
White Plains, N. Y.

WIRE DRAWING COMPOUNDS

Grafo Colloids Corp.
Sharon, Pa.

L. R. Kerns Co.
2657 E. 95th St.
Chicago, Ill.

Oakite Products, Inc.
50A Rector St.
New York 6, N. Y.

Pennsalt Chemicals Corp.
Three Penn Center
Philadelphia 2, Pa.

EQUIPMENT

AIR QUENCHING EQUIPMENT, EXTRUSION

DeBothezat Fans Div'n
East Moline, Ill.

ANODIZING EQUIPMENT

The Gilbert Tramer Co
1217 Main
Cleveland, Ohio

BARREL FINISHING EQUIPMENT

Allied Research Products Inc.
4004 E. Monument St.
Baltimore 5, Md.

Sutton Engineering Co.
First National Bank Bldg.
Pittsburgh 22, Pa.

BEARINGS

Mesta Machine Co.
P. O. Box 1466
Pittsburgh 30, Pa.

Morgan Construction Co.
Worcester, Mass.

BELT GRINDERS, ABRASIVE

Hammond Machinery Builders
1600 Douglas Ave.
Kalamazoo, Michigan

BENDER, TUBE AND BAR

Wallace Supplies Manufacturing
1808 W. Cornelia Ave.
Chicago 13, Ill.

BILLET CUTTERS

Loma Machine Manufacturing Co.
114 East 32nd Street
New York 16, New York

Stone Machinery Co., Inc.
Manlius, New York

BILLET HEATERS

Ajax-Magnethermic Corp.
3990 Simon Road
Youngstown 7, Ohio

Granco, Inc.
317 32nd St., S.W.
Grand Rapids 8, Mich.

Hevi-Duty Electric Co.
Div. Basic Products Corp.
3002 W. Burleigh St.
Milwaukee, Wis.

The Lanly Company
2800 Euclid Ave.
Cleveland 15, Ohio

Lindberg Engineering Co.
2446 W. Hubbard St.
Chicago 12, Ill.

The Carl Mayer Corporation
20800 Center Ridge Rd.
Cleveland 16, Ohio

Morrison Engineering Corp.
P. O. Box 4345
Cleveland 32, Ohio

W. S. Rockwell Co., Inc.
2060 Eliot Street
Fairfield, Conn.

Sunbeam Equipment Corp.
180 Mercer St.
Meadville, Pa.

DISTRIBUTORS AND JOBBERS

These firms warehouse most forms of aluminum—sheet, coil, rod, tube, extrusions, etc.—and are located in all major industrial areas.

Aluminum Mill Supply Corp.
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Brooklyn 1, N. Y.

Aluminum Transatlantic, Inc.
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New York 20, N. Y.

Atlantic Aluminum & Metal Distributors, Inc.
Page Boulevard
Springfield, Massachusetts

A. M. Castle & Co.
3400 N. Wolf Road
Franklin Park, Ill.

Chase Brass & Copper Co.
Waterbury 20, Conn.

T. E. Conklin Brass & Copper Co., Inc.
54 Lafayette St.
New York 13, N. Y.

Copper & Brass Sales, Inc.
6555 E. Davison
Detroit 12, Mich.

Peter A. Frasse and Company
17 Grand Street
New York, N. Y.

Fromson Orban Co., Inc.
261 Madison Ave.
New York 16, N. Y.

E. M. Jorgensen Company
10650 South Alameda
Los Angeles, California

Kilsby-Tubesupply
2501 S. Malt Ave.
Los Angeles 22, Calif.

A. B. Murray Co., Inc.
P. O. Box 476
Elizabeth, N. J.

Precision Steel Warehouse, Inc.
3500 North Wolf Road
Franklin Park, Illinois

Reynolds Aluminum Supply Co.
573 W. Peachtree Street, N.E.
Atlanta, Georgia

Joseph T. Ryerson & Son, Inc.
16th and Rockwell Streets
Chicago 80, Illinois

Warwick Industrial Furnace & Engineering Corp.
452 W. Chicago Ave.
Chicago 10, Ill.

BUFFING & POLISHING EQUIPMENT

Hammond Machinery Builders
1600 Douglas Ave.
Kalamazoo, Michigan

The Gilbert Tramer Co.
1217 Main Ave.
Cleveland 13, Ohio

BURNERS, OIL, GAS

E. W. Bliss Company
Canton 10, Ohio

CASTABLES, REFRACTORIES

Babcock & Wilcox Corp.
161 E. 42nd Street
New York 17, N. Y.

CASTING EQUIPMENT, BILLET

Hunter Engineering Co.
1495 Columbia Ave.
Riverside, Calif.

Lobeck Casting Processes Inc.
114 E. 32nd St.
New York 16, N. Y.

Morrison Engineering Corp.
P. O. Box 4345
Cleveland 32, Ohio

Permanent Mold Die Co., Inc.
2275 E. Nine Mile Road
Hazel Park, Mich.

CASTING MACHINES CONTINUOUS

Lobeck Casting Processes Inc.
114 E. 32nd St.
New York 16, N. Y.

COATING THICKNESS TESTER

Unit Process Assemblies, Inc.
53-15 37th Ave.
Woodside 77, New York, N. Y.

COLD DRAW EQUIPMENT

The Aetna-Standard Div.
Blaw-Knox Co.
Frick Building
Pittsburgh 30, Pa.

American Laubscher Corp.
250 W. 57th St.
New York 19, N. Y.

Lake Erie Machinery Corp.
883 Woodward Ave.
Buffalo 17, N. Y.

Loma Machine Mfg. Co., Inc.
114 E. 32nd St.
New York 16, N. Y.

COLD DRAWING MACHINE, CONTINUOUS

American Laubscher Corp.
250 W. 57th St.
New York 19, N. Y.

CUTTING MACHINES

Loma Machine Mfg. Co., Inc.
114 E. 32nd St.
New York 16, N. Y.

Mettler Machine Tool Inc.
155 Adeline St.
New Haven, Conn.

Stone Machinery Co., Inc.
Manlius, N. Y.

Wallace Supplies Mfg. Co.
1808 W. Cornelia Ave.
Chicago 13, Ill.

CUTTING MACHINES, WIRE

Mettler Machine Tool Inc.
155 Adeline St.
New Haven, Conn.

CUT-OFF MACHINES

American Roller Die Corp.
29510 Clayton Avenue
Wickliffe, Ohio

Loma Machine Mfg. Co., Inc.
114 E. 32nd St.
New York 16, N. Y.

Michigan Roll Form, Inc.
8909 Hubbell
Detroit 28, Mich.

Oliver Machinery Company
445 Sixth Street, N.W.
Grand Rapids 2, Michigan

Stone Machinery Co., Inc.
Manlius, New York

Wallace Supplies Manufacturing Co.
1808 W. Cornelia Ave.
Chicago 13, Ill.

The Yoder Company
5539 Walworth Ave.
Cleveland 2, Ohio

DETWISTING MACHINES

Feller Engineering Co.
1159 Empire Building
Pittsburgh 22, Pa.

Lake Erie Machinery Corp.
883 Woodward Ave.
Buffalo 17, N. Y.

Loewy-Hydropress
Div. Baldwin-Lima-Hamilton
111 Fifth Avenue
New York 3, New York

Loma Machine Mfg. Co., Inc.
114 E. 32nd St.
New York 16, N. Y.

Sutton Engineering Co.
First National Bank Bldg.
Pittsburgh 22, Pa.

Watson-Stillman Press Div.
Farrel-Birmingham Co., Inc.
565 Blossom Road
Rochester 10, N. Y.

DIE CASTING MACHINES

Como-Cast Corp.
Subs. Basic Products Corp.
3002 West Burleigh
Milwaukee 1, Wisconsin

B & T Machinery Co.
Div. Greenlee Bros. & Co.
217 W. Eighth St.
Holland, Mich.

Cast-Master
Div. of Koehring Co.,
Hydraulic Press Mfg. Div.
23901 Aurora Road
Bedford, Ohio

Lake Erie Machinery Corp.
883 Woodward Ave.
Buffalo 17, N. Y.

Loewy-Hydropress
Div. Baldwin-Lima-Hamilton
111 Fifth Avenue
New York 3, New York

DIE HEATERS

Hevi-Duty Electric Co.
Div. Basic Products Corp.
3002 W. Burleigh St.
Milwaukee, Wis.

The Carl Mayer Corp.
20800 Center Ridge Rd.
Cleveland 16, Ohio

The Lanly Co.
2800 Euclid Ave.
Cleveland 15, Ohio

DIES, DIE CASTING

Damen Tool & Engineering Co.
4623 N. Olcott Ave.
Chicago, Ill.

Lake Erie Machinery Corp.
883 Woodward Ave.
Buffalo 17, N. Y.

Permanent Mold Die Co., Inc.
2275 E. Nine Mile Road
Hazel Park, Mich.

DIES, EXTRUSION

Lake Erie Machinery Corp.
883 Woodward Ave.
Buffalo 17, N. Y.

Moczik Tool & Die Works
9511 Grinnell Avenue
Detroit 13, Michigan

PMD Extrusion Die Co.
5747 Beebe Ave.
Warren, Mich.

Superior Extrusion Tool & Die Company
56 S. Meridian Road
Youngstown 9, Ohio

DIES, NOTCHING

Michigan Roll Form, Inc.
8909 Hubbell
Detroit 28, Mich.

DIES, PERMANENT MOLD

Permanent Mold Die Co., Inc.
2375 E. 9-Mile Rd.
Hazel Park, Mich.

DIES, ROLL FORMING

American Roller Die Corp.
29501 Clayton Avenue
Wickliffe, Ohio

Brunken & Goodwin Tool Engineering
7 North Second St.
Maywood, Ill.

Michigan Roll Form
8909 Hubbell
Detroit 28, Mich.

The Yoder Company
5539 Walworth Ave.
Cleveland 2, Ohio

DOCK BOARDS, MAGNESIUM

Brooks & Perkins, Inc.
1950 W. Fort St.
Detroit 16, Mich.

DRAWBENCHES

The Aetna-Standard Div.
Blaw-Knox Co.
Frick Building
Pittsburgh 30, Pa.

American Laubscher Corp.
250 W. 57th St.
New York 19, N. Y.

Lake Erie Machinery Corp.
883 Woodward Ave.
Buffalo 17, N. Y.

Loewy-Hydropress
Div. Baldwin-Lima-Hamilton
111 Fifth Avenue
New York 3, New York

Loma Machine Mfg. Co., Inc.
114 E. 32nd St.
New York 16, N. Y.

DRYERS, STRIP & SHEET, CONTINUOUS

W. S. Rockwell Co., Inc.
2060 Eliot Street
Fairfield, Conn.

DUST COLLECTION UNITS

Hammond Machinery Builders, Inc.
1609 Douglas Avenue
Kalamazoo, Michigan

ELECTROPLATING EQUIPMENT

Allied Research Products Inc.
4004 E. Monument St.
Baltimore 5, Md.

The Gilbert Tramer Co.
1217 Main Ave.
Cleveland 13, Ohio

EXTRUSION COILERS

Feller Engineering Co.
1159 Empire Building
Pittsburgh 22, Pa.

Loma Machine Mfg. Co., Inc.
114 E. 32nd St.
New York 16, N. Y.

EXTRUSION PRESS TOOLS

Ajax Steel & Forge Co.
205 Adair St.
Detroit 7, Mich.

Lake Erie Machinery Corp.
883 Woodward Ave.
Buffalo 17, N. Y.

FILMS, X-RAY

Eastman Kodak Company
X-Ray Division
343 State Street
Rochester 4, New York

FOIL MILLS

Blaw-Knox Co.
Blawnox, Pa.

E. W. Bliss Company
Salem, Ohio

Loewy-Hydropress
Div. Baldwin-Lima-Hamilton
111 Fifth Avenue
New York 3, New York

Mesta Machine Co.
P. O. Box 1466
Pittsburgh 30, Pa.

United Engineering & Foundry Co.
Pittsburgh 22, Pennsylvania

FORMING MACHINES

American Roller Die Corp.
29510 Clayton Avenue
Wickliffe, Ohio

The Yoder Co.
5539 Walworth Ave.
Cleveland 2, Ohio

FORMING ROLLS

American Roller Die Corp.
29510 Clayton Avenue
Wickliffe, Ohio

The Lockformer Co.
4617 W. Roosevelt Rd.
Chicago 50, Ill.

The Yoder Company
5539 Walworth Avenue
Cleveland 2, Ohio

FURNACE CONTROL EQUIPMENT

Morgan Construction Co.
Worcester, Mass.

FURNACES, ANNEALING

Lee-Wilson Engineering Co.
20005 Lake Rd.
Cleveland 16, Ohio

Sunbeam Equipment Corp.
196 Mercer St.
Meadville, Pa.

FURNACES, BRAZING

Lindberg Engineering Co.
2446 W. Hubbard
Chicago, Ill.

Sunbeam Equipment Corp.
196 Mercer St.
Meadville, Pa.

FURNACES, HEAT TREATING

Ajax-Magnethermic Corp.
3990 Simon Road
Youngstown 7, Ohio

Hevi-Duty Electric Co.
Div. Basic Products Corp.
3002 W. Burleigh St.
Milwaukee, Wis.

The Lanly Company
2800 Euclid Ave.
Cleveland 15, Ohio

Lee-Wilson Engineering Co.
20005 Lake Rd.
Cleveland 16, Ohio

FURNACES, HEAT TREATING (Cont.)

Lindberg Engineering Co.
2446 W. Hubbard
Chicago, Illinois

The Carl Mayer Corporation
20800 Center Ridge Rd.
Cleveland 16, Ohio

Morrison Engineering Corp.
P. O. Box 4345
Cleveland 32, Ohio

W. S. Rockwell Co., Inc.
2060 Eliot Street
Fairfield, Conn.

Sunbeam Equipment Corp.
196 Mercer St.
Meadville, Pa.

Swindell-Dressler Corp.
P. O. Box 1888
Pittsburgh, Pa.

Warwick Industrial Furnace & Engineering Corp.
452 W. Chicago Ave.
Chicago 10, Ill.

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Ajax-Magnethermic Corp.
3990 Simon Road
Youngstown 7, Ohio

Hevi-Duty Electric Co.
Div. Basic Products Corp.
3002 W. Burleigh St.
Milwaukee, Wis.

The Lanly Company
755 Prospect Avenue
Cleveland, Ohio

Lee-Wilson Engineering Co.
2005 Lake Rd.
Cleveland 16, Ohio

Lindberg Engineering Co.
2446 W. Hubbard
Chicago, Ill.

The Carl Mayer Corporation
20800 Center Ridge Rd.
Cleveland 16, Ohio

Morrison Engineering Corp.
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Cleveland 32, Ohio

W. S. Rockwell Co., Inc.
2060 Eliot Street
Fairfield, Conn.

Sunbeam Equipment Corp.
196 Mercer St.
Meadville, Pa.

Swindell-Dressler Corp.
P. O. Box 1888
Pittsburgh, Pa.

Warwick Industrial Furnace & Engineering Corp.
452 W. Chicago Ave.
Chicago 10, Ill.

FURNACES, MELTING

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Ajax-Magnethermic Corp.
P. O. Box 1418
Trenton 7, N. J.

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Div. Basic Products Corp
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2446 W. Hubbard
Chicago, Ill.

The Carl Mayer Corporation
20800 Center Ridge Rd.
Cleveland 16, Ohio

Morrison Engineering Corp.
P. O. Box 4345
Cleveland 32, Ohio

W. S. Rockwell Co., Inc.
2060 Eliot Street
Fairfield, Conn.

Sunbeam Equipment Corp.
196 Mercer St.
Meadville, Pa.

Swindell-Dressler Corp.
P. O. Box 1888
Pittsburgh, Pa.

Warwick Industrial Furnace & Engineering Corp.
452 W. Chicago Ave.
Chicago 10, Ill.

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Hevi-Duty Electric Co.
Div. Basic Products Corp.
3002 W. Burleigh St.
Milwaukee, Wis.

Lindberg Engineering Co.
2446 W. Hubbard St.
Chicago 12, Ill.

Sunbeam Equipment Corp.
196 Mercer St.
Meadville, Pa.

GRINDERS, BELT

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445 Sixth Street, N.W.
Grand Rapids 2, Michigan

GRINDERS, DISC

Oliver Machinery Company
445 Sixth Street, N.W.
Grand Rapids 2, Michigan

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250 W. 57th St.
New York 19, N. Y.

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1609 Douglas Avenue
Kalamazoo, Michigan

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Chicago 31, Ill.

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Pittsburgh 30, Pa.

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Salem, Ohio

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Hyde Park
Westmoreland County, Pa.

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New York 3, New York

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114 E. 32nd St.
New York 16, N. Y.

Stanat Manufacturing Company, Inc.
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Westbury, N. Y.

Sutton Engineering Company
First National Bank Building
Pittsburgh 22, Pennsylvania

United Engineering & Foundry Co.
Pittsburgh 22, Pennsylvania

Voss Engineering Co.
7301 Penn Ave.
Pittsburgh 8, Pa.

F. A. Woehr Machine Co.
17 Favor St.
Rochester, N. Y.

Youngstown Foundry & Machine Co
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Youngstown 2, Ohio

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114 E. 32nd St.
New York 16, N. Y.

Oliver Machinery Company
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Grand Rapids 2, Michigan

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114 E. 32nd St.
New York 16, N. Y.

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Milwaukee, Wis.

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Cleveland 15, Ohio

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20800 Center Ridge Rd.
Cleveland 16, Ohio

Lindberg Engineering Co.
2446 W. Hubbard St.
Chicago 12, Ill.

Morrison Engineering Corp.
P. O. Box 4345
Cleveland 32, Ohio

W. S. Rockwell Co., Inc.
2060 Eliot Street
Fairfield, Conn.

Sunbeam Equipment Corp.
196 Mercer St.
Meadville, Pa.

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Ajax-Magnethermic Corporation
3990 Simon Road
Youngstown 7, Ohio

Hevi-Duty Electric Co.
Div. Basic Products Corp.
3002 W. Burleigh St.
Milwaukee, Wis.

The Lanly Company
2800 Euclid Ave.
Cleveland 15, Ohio

Lindberg Engineering Co.
2446 Hubbard St.
Chicago 12, Ill.

The Carl Mayer Corporation
20800 Center Ridge Rd.
Cleveland 16, Ohio

Morrison Engineering Corp.
P. O. Box 4345
Cleveland 32, Ohio

W. S. Rockwell Co., Inc.
2060 Eliot Street
Fairfield, Conn.

Sunbeam Equipment Corp.
196 Mercer St.
Meadville, Pa.

Warwick Industrial Furnace & Engineering Corp.
452 W. Chicago Ave.
Chicago 10, Ill.

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Hazel Park, Mich.

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The Meaker Co.
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Chicago 50, Ill.

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Canton, Ohio

Feller Engineering Company
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Pittsburgh 22, Pennsylvania

Lake Erie Machinery Corp.
883 Woodward Ave.
Buffalo 17, N. Y.

Loewy-Hydropress
Div. Baldwin-Lima-Hamilton
111 Fifth Avenue
New York 3, New York

Watson-Stillman Press Div.
Farrel-Birmingham Co., Inc.
565 Blossom Road
Rochester 10, N. Y.

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Birdsboro, Pa.

E. W. Bliss Co.
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Canton, Ohio

Feller Engineering Company
1159 Empire Building
Pittsburgh 22, Pennsylvania

Lake Erie Machinery Corp.
883 Woodward Ave.
Buffalo 17, N. Y.

Loewy-Hydropress
Div. Baldwin-Lima-Hamilton
111 Fifth Avenue
New York 3, New York

Sutton Engineering Company
First National Bank Building
Pittsburgh 22, Pennsylvania

Watson-Stillman Press Div.
Farrel-Birmingham Co., Inc.
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Rochester 10, N. Y.

Youngstown Foundry & Machine Co.
Reserve Street
Youngstown 2, Ohio

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Canton, Ohio

Feller Engineering Company
1159 Empire Building
Pittsburgh 22, Pennsylvania

Lake Erie Machinery Corp.
883 Woodward Ave.
Buffalo 17, N .Y.

Loewy-Hydropress
Div. Baldwin-Lima-Hamilton
111 Fifth Avenue
New York 3, New York

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P. O. Box 1466
Pittsburgh 30, Pa.

United Engineering & Foundry Co.
Pittsburgh 22, Pa.

Watson-Stillman Press Div.
Farrel-Birmingham Co., Inc.
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Rochester 10, N. Y.

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104 E. 40th Street
New York 16, N. Y.

E. W. Bliss Co.
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Canton, Ohio

Lake Erie Machinery Corp.
883 Woodward Ave.
Buffalo 17, N. Y.

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Cleveland 4, Ohio

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Servi-Sure Mfg. Co.
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Chicago 7, Illinois

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Cleveland 13, Ohio

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New Haven, Conn.

F. A. Woehr Machine Co.
17 Favor St.
Rochester, N. Y.

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Arnold Metals & Machinery, Inc.
596 River Road
Clifton, New Jersey

Flexolite Mfg. Corp.
1887 State St.
Schenectady 4, N. Y.

The Lockformer Co.
4617 W. Roosevelt Rd.
Chicago 50, Ill.

Michigan Roll Form, Inc.
8909 Hubbell
Detroit 28, Mich.

The Yoder Company
5539 Walworth Ave.
Cleveland 2, Ohio

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American Roller Die Corp.
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Wickliffe, Ohio

Brunken & Goodwin Tool Engineering
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Maywood, Ill.

The Lockformer Co.
4617 W. Roosevelt Rd.
Chicago 50, Ill.

The Yoder Company
5539 Walworth Ave.
Cleveland 2, Ohio

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Blawnox, Pa.

E. W. Bliss Company
Salem, Ohio

Feller Engineering Co.
1159 Empire Building
Pittsburgh 22, Pa.

Hunter Engineering Co.
1495 Columbia Ave.
Riverside, Calif.

Hyde Park Foundry & Machine Co.
Hyde Park
Westmoreland County, Pa.

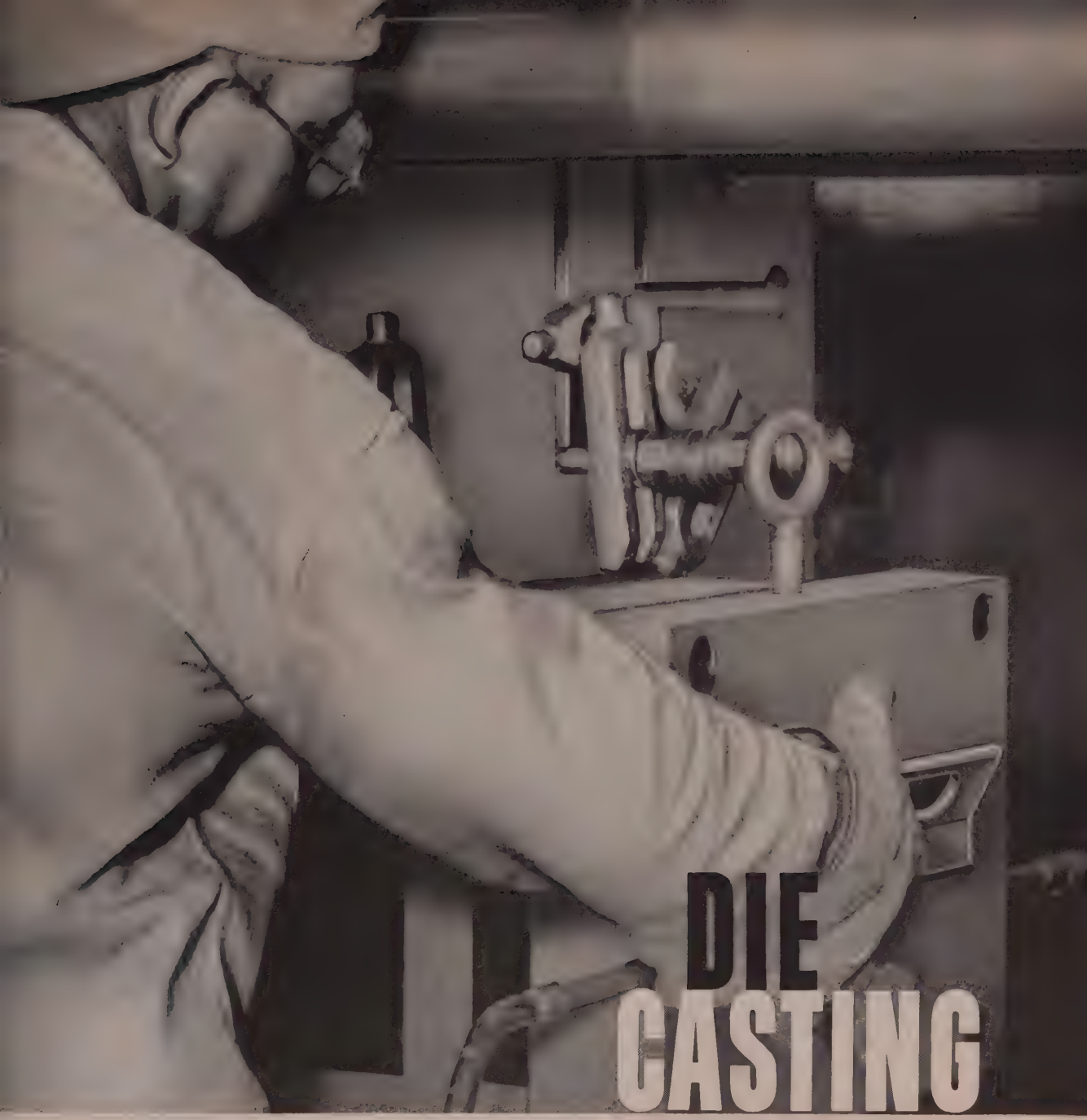
Loewy-Hydropress
Div. Baldwin-Lima-Hamilton
111 Fifth Avenue
New York 3, New York

Loma Machine Mfg. Co. Inc.
114 E. 32nd St.
New York 16, N. Y.

Mesta Machine Co.
P. O. Box 1466
Pittsburgh 30, Pa.

Morgan Construction Co.
Worcester, Mass.

Pittsburgh Engineering & Machine Div.
Pittsburgh Steel Foundry Co.
Glassport, Pa.



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Blawnox, Pa.

E. W. Bliss Company
Salem, Ohio

Feller Engineering Co.
1159 Empire Building
Pittsburgh 22, Pa.

Hyde Park Foundry & Machine Co.
Hyde Park
Westmoreland County, Pa.

Loewy-Hydropress
Div. Baldwin-Lima-Hamilton
111 Fifth Avenue
New York 3, New York

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114 E. 32nd St.
New York 16, N. Y.

Mesta Machine Co.
P. O. Box 1466
Pittsburgh 30, Pa.

Morgan Construction Co.
Worcester, Mass.

Pittsburgh Engineering & Machine Div.
Pittsburgh Steel Foundry Co.
Glassport, Pa.

Sutton Engineering Company
First National Bank Building
Pittsburgh 22, Pennsylvania

United Engineering & Foundry Co
Pittsburgh 22, Pa.

The Yoder Company
5539 Walworth Ave.
Cleveland 2, Ohio

Youngstown Foundry & Machine Co.
Reserve Street
Youngstown 2, Ohio

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Canton 6, Ohio

Loma Machine Mfg. Co., Inc.
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New York 16, N. Y.

Motch & Merryweather
Cutting Tool Mfg. Div.
Cleveland 17, Ohio

North American Products Co.
P. O. Box 291M
Jasper, Ind.

Stone Machinery Co., Inc.
Manlius, N. Y.

SAWS, BAND

Oliver Machinery Company
445 Sixth Street, N.W.
Grand Rapids 2, Michigan

SAWS, CIRCULAR

Loma Machine Mfg. Co., Inc.
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New York 16, N. Y.

Oliver Machinery Co.
445 Sixth St., N.W.
Grand Rapids 2, Mich.

Stone Machinery Co., Inc.
Manlius, N. Y.

Ty-Sa-Man Machine Co.
820 White Ave.
Knoxville, Tenn.

Wallace Supplies Manufacturing Co.
1808 W. Cornelia Ave.
Chicago 13, Ill.

SAWS, CUT-OFF

Loma Machine Mfg. Co.
114 E. 32nd St.
New York 16, N. Y.

Oliver Machinery Co.
445 Sixth St., N.W.
Grand Rapids 2, Mich.

Stone Machinery Co., Inc.
Manlius, N. Y.

Ty-Sa-Man Machine Co.
820 White Ave.
Knoxville, Tenn.

Wallace Supplies Manufacturing Co.
1808 W. Cornelia Ave.
Chicago 13, Ill.

SAWS, MITRE

LeTarte Metal Specialties Co.
18105 E. Nine Mile Rd.
East Detroit, Mich.

Stone Machinery Co., Inc.
Manlius, N. Y.

SAWS, RADIAL ARM TYPE

Loma Machine Mfg. Co., Inc.
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New York 16, N. Y.

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SCALPERS, INGOT

Loma Machine Mfg. Co., Inc.
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New York 16, N. Y.

SHEARING EQUIPMENT

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Salem, Ohio

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Hyde Park
Westmoreland County, Pa.

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Buffalo 17, N. Y.

Loewy-Hydropress
Div. Baldwin-Lima-Hamilton
111 Fifth Avenue
New York 3, New York

Loma Machine Mfg. Co., Inc.
114 E. 32nd St.
New York 16, N. Y.

Mesta Machine Co.
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Pittsburgh 30, Pa.

United Engineering & Foundry Co.
Pittsburgh, Pennsylvania

Youngstown Foundry & Machine Co.
Reserve Street
Youngstown 2, Ohio

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Permanent Mold Die Co., Inc.
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Hazel Park, Mich.

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Blaw-Knox Co.
Frick Building
Pittsburgh 30, Pa.

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Salem, Ohio

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New York 16, N. Y.

The Lockformer Co.
4617 W. Roosevelt Rd.
Chicago 50, Ill.

Mesta Machine Co.
P. O. Box 1466
Pittsburgh 30, Pa.

Stanat Manufacturing Co., Inc.
500 Shames Dr.
Westbury, N. Y.

The Yoder Company
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Youngstown Foundry & Machine Co.
Reserve Street
Youngstown 2, Ohio

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Hazel Park, Mich.

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Cambridge 38, Mass.

Jarrell-Ash Co.
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Newtonville 60, Mass.

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Pennsalt Chemicals Corp.
Three Penn Center
Philadelphia 2, Pa.

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New Haven, Conn.

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Buffalo 17, N. Y.

Mettler Machine Tool Inc.
155 Adeline St.
New Haven, Conn.

Sutton Engineering Co.
First National Bank Bldg.
Pittsburgh 22, Pa.

STRAIGHTENERS, TUBE AND BAR

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New York 19, N. Y.

Lake Erie Machinery Corp.
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Buffalo 17, N. Y.

Loewy-Hydropress
Div. Baldwin-Lima-Hamilton
111 Fifth Avenue
New York 3, New York

Loma Machine Mfg. Co., Inc.
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New York 16, N. Y.

Mackintosh-Hemphill Division
E. W. Bliss Company
901 Bingham Street
Pittsburgh 3, Pennsylvania

Mettler Machine Tool, Inc.
155 Adeline St.
New Haven, Conn.

Sutton Engineering Company
First National Bank Building
Pittsburgh 22, Pennsylvania

Watson-Stillman Press Div.
Farrel-Birmingham Co., Inc.
565 Blossom Road
Rochester 10, N. Y.

STRETCHERS, EXTRUSION

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Pittsburgh 22, Pennsylvania

Lake Erie Machinery Corp.
883 Woodward Ave.
Buffalo 17, N. Y.

Loewy-Hydropress
Div. Baldwin-Lima-Hamilton
111 Fifth Avenue
New York 3, New York

Loma Machine Mfg. Co., Inc.
114 E. 32nd St.
New York 16, N. Y.

Sutton Engineering Co.
First National Bank Bldg.
Pittsburgh 22, Pa.

Watson-Stillman Press Div.
Farrel-Birmingham Co., Inc.
565 Blossom Road
Rochester 10, N. Y.

Youngstown Foundry & Machine Co
Reserve Street
Youngstown 2, Ohio

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Westmoreland County, Pa.

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Buffalo 17, N. Y.

Loewy-Hydropress
Div. Baldwin-Lima-Hamilton
111 Fifth Ave.
New York 3, N. Y.

Loma Machine Mfg. Co., Inc.
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New York 16, N. Y.

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Farrel-Birmingham Co., Inc.
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Rochester 10, N. Y.

Youngstown Foundry & Machine Co.
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Youngstown 2, Ohio

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Buffalo 17, N. Y.

Loma Machine Mfg. Co., Inc.
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New York 16, N. Y.

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Cleveland 2, Ohio

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Pittsburgh 22, Pa.

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5539 Walworth Ave.
Cleveland 2, Ohio

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Frick Building
Pittsburgh 30, Pa.

American Roller Die Corp.
29510 Clayton Avenue
Wickliffe, Ohio

Brunken & Goodwin Tool Engineering Co.
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Maywood, Ill.

The Lockformer Co.
4617 W. Roosevelt Rd.
Chicago 50, Ill.

The Yoder Company
5539 Walworth Ave.
Cleveland 2, Ohio

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First National Bank Bldg.
Pittsburgh 22, Pa.

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Morgan Construction Co.
Worcester, Mass.

Stanat Manufacturing Company, Inc.
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Newark 12, N. J.

Southern Extrusions Co.
North Washington St.
Magnolia, Ark.

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Youngstown, Ohio

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Chicago 12, Ill.

Pyro Metal Finishers
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Newark 12, N. J.

Sanford Aluminum Processing Co., Inc.
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Chicago 7, Ill.

ANODIZING, MAGNESIUM

Brooks & Perkins, Inc.
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Detroit 16, Mich.

FABRICATING ALUMINUM

Aloxon Corp.
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Madison Heights, Mich.

Aluminum Company of America
877 Alcoa Building
Pittsburgh 19, Pa.

Aluminum Extrusions, Inc.
Charlotte, Mich.

Cipco Corporation
22nd & Cole Streets
St. Louis 6, Mo.

Brooks & Perkins, Inc.
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Detroit 16, Mich.

The Dow Metal Products Co.
Div'n, Dow Chemical Co.
Midland, Mich.

General Extrusions, Inc.
4040 Lake Park Road
Youngstown, Ohio

Harvey Aluminum
Torrance, Calif.

LaPointe Industries Inc.
Rockville, Conn.

North American Extrusions Corp.
5569 N. Riverview Drive
Kalamazoo, Mich.

Pfister Aluminum Corp.
50 West Allendale Ave.
Allendale, N. J.

Quaker State Metals Co.
Manheim Pike at 230 Bypass
Lancaster, Pa.

Reynolds Metals Company
6601 W. Broad St.
Richmond 18, Va.

Rogers Industries, Inc.
14575 Meyers Road
Detroit 27, Mich.

Southern Extrusions Co.
North Washington St.
Magnolia, Ark.

Wells Aluminum Corp.
North Liberty, Ind.

Wolverine Tube Div.
Calumet & Hecla, Inc.
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Allen Park, Mich.

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Midland, Michigan

FABRICATING, TITANIUM

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Detroit 16, Mich.

The Dow Metal Products Co.
Div'n, Dow Chemical Co.
Midland, Mich.

Harvey Aluminum
Torrance, Calif.

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James Talcott, Inc.
221 Fourth Avenue
New York, New York

INSPECTION SERVICE

Magnaflux Corp.
7300 W. Lawrence Ave.
Chicago 31, Ill.

PLATING, MAGNESIUM

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Detroit 16, Mich.

PORCELAIN ENAMELING SOURCE

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Madison Heights, Mich.

Ferro Corporation
4150 E. 56th St.
Cleveland 5, Ohio

SLITTING SOURCE

Fairmont Aluminum Co.
Fairmont, W. Va.

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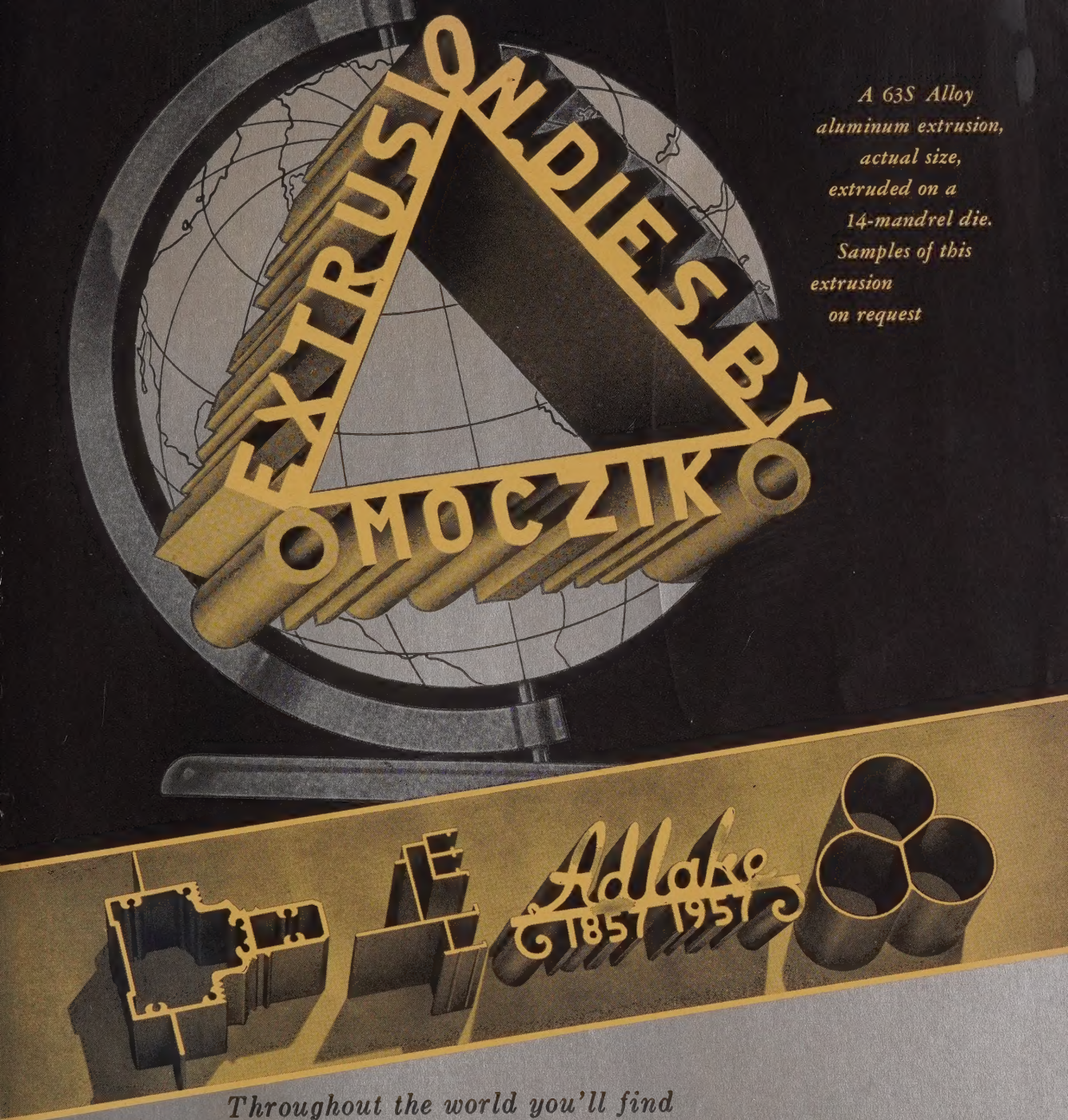

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Looking Ahead

Excess aluminum capacity and the consequent downward pressure on profits may force Reynolds Metals Co. to "trim its sails" as far as new projects are concerned. The company has already postponed capital spending, said president Richard S. Reynolds, Jr., in an interview last month with a *New York Times* reporter. Noting that Reynolds' level of orders had been "on a plateau" for nearly a year, Reynolds was quoted as seeing "no sure sign of an imminent upturn." He also predicted that "sales will be off this year and so will profits as a result of increased costs and price cutting." Referring to the industry's continuing overcapacity problem, Reynolds observed: "All of us have expanded facilities, with no return on them as yet." Thus, he became the first official of a primary producer to publicly acknowledge the true condition of the aluminum industry today.

Alcoa's new president, Lawrence Litchfield, Jr., seemed less concerned when interviewed by a Dow Jones staff reporter early this month. Litchfield said that Alcoa's capital outlays this year would total $85 million "and if I had to guess now I'd say we'll equal or exceed that in 1961." In contrast, Alcoa's capital spending last year came to $55 million. On the other hand, Litchfield conceded that industry shipments in '60 "may not match the record 2,480,000 tons of 1959," and that severe competition "will affect earnings for the year, as well as hamper dollar sales totals somewhat . . ." Nevertheless, Alcoa's new chief declared that "the future of the aluminum industry over the long pull never looked better."

The over-abundant aluminum capacity was interpreted as a sign of strength by D. A. Rhoades, president of Kaiser Aluminum. In a statement released October 14, Rhoades attributed the industry's present idle capacity to: "The difficult adjustment of production levels and inventories to the short-term cyclical movement of business;" and to the tremendous expansion which the industry completed only recently "to provide a production base that would be adequate to supply increasing aluminum requirements." He also noted that while severe competition affects earnings, it also stimulates management to place more effective controls on the cost of production, sales and administration.

How to counter cut-throat pricing? Here are three good examples. One big producer of aluminum building products, faced with vanishing profit margins four years ago, simply raised prices to sensible levels. They lost plenty of business the following year, but their earnings statement has perked up considerably since then. Comments the company president: "We just decided that we'd better grow up and either get a reasonable return or go into some other business. Of course, we were afraid our sales curve would suffer, but since we hiked prices we've never had it so good."

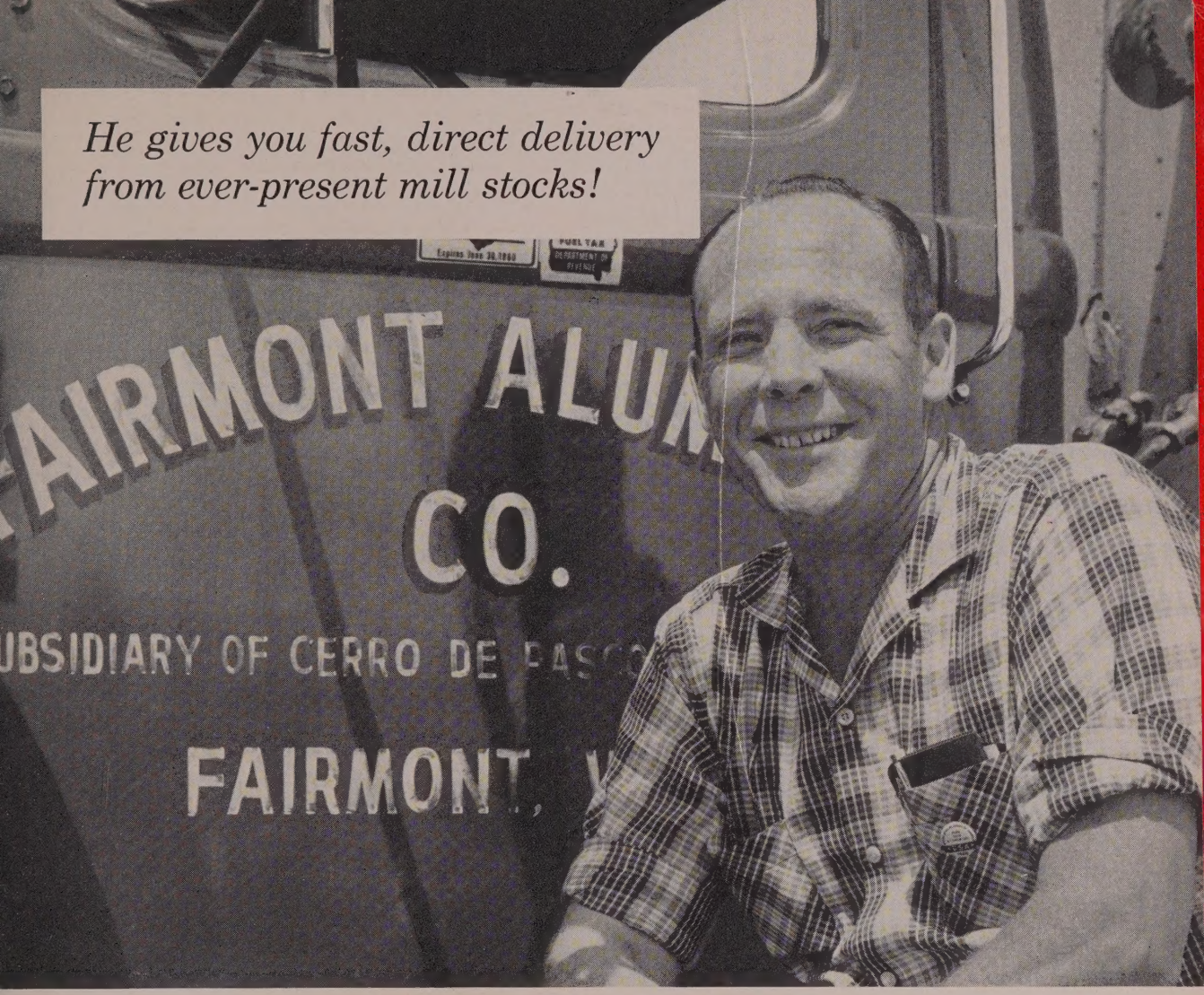
Another aluminum outfit that had helped pioneer some building products years ago, was suddenly confronted with imported stuff priced 20 to 30% below the market. To the buyer, this looks good – on the surface. But there's a hitch – 90-day delivery, and no guarantee. Then, too, you have to buy the stuff for cash off the boat – unheard of in the aluminum business. The strategy adopted by this company was simple: Meet the foreign price on a one-shot basis, and give better delivery and reasonable credit terms. From what we hear, this approach is working. On this basis, some import threats could be whipped within a year.

Our third example: A legitimate contractor was asked to bid on a home for a family that had shopped the look-alike mass housing developments. He thought he could never compete with a development house. But when he was told what they sold for, he found that he was very competitive on a square foot basis and could offer a helluva lot more in true value. Moral: Quality plus sane pricing can lick the price cutting problem and deliver a severe jolt to the "blue suede shoe" operators in all types of industries.

Next year should be a good one for aluminum in the railroad market, but it won't come close to the volume of aluminum business the railroads will generate later on. Southern Pacific Railroad has included 300 aluminum covered hopper cars in its 1961 freight car program. This is a follow-up of the 200 covered hopper cars delivered to SP earlier this year, around the time The Southern Railroad was taking delivery of 1205 aluminum gondolas and covered hoppers. Louisville & Nashville RR is also preparing to place an order for aluminum cars. Obviously, the light metal isn't the outcast it used to be; its reputation will improve with the railroads from now on.

Rapid transit cars look increasingly important to the aluminum producers. We think this segment of the transportation field is capable of consuming some 75,000 tons of sheet, plate, extrusions and castings, as the nation's six largest cities draw up plans to expand and strengthen existing rapid transit systems. "It's one of the biggest potential markets we've ever seen," said T. C. Gray, engineering vice president of Pullman-Standard, Chicago. "This won't happen within, say, the next six months, but before very long there will be an avalanche of rapid transit business." Gray believes that a 50,000-car requirement for big city rapid transit systems in the next 10 years is far from a fanciful figure. If all these cars were all-aluminum above the trucks it would represent possibly 750,000 tons.

— The Editors



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